CHAPTER 14

ORGANIC SUPPORT WEAPONS: 60-MM MORTAR AND AT4

The mortar is perhaps the oldest type of firearm known to mankind, and its existence dates back as early as the fourteenth century. At that time, it was nothing more than a shallow steel pot filled with gunpowder and rocks that was aimed in the general direction of the target and fired by touching the powder with a red-hot iron rod. As you can guess, it was very inaccurate; however, it did possess one extremely important characteristic that is just as important today as it was then. This characteristic is the high angle of fire that enables it to be fired over obstacles, such as hills, forests, walls, or other defenses. As you can see, this is very important. The weapon can reach and destroy targets beyond the capabilities of flat trajectory weapons, such as a rifle, but the crew firing it is also protected from enemy observation and fire by these same obstacles.

The modern mortar is an extremely accurate and effective weapon that has an adjustable biped and telescopic sight (fig. 14- 1). The modern mortar has a one- or two-piece baseplate that allows it to be fired in any direction.

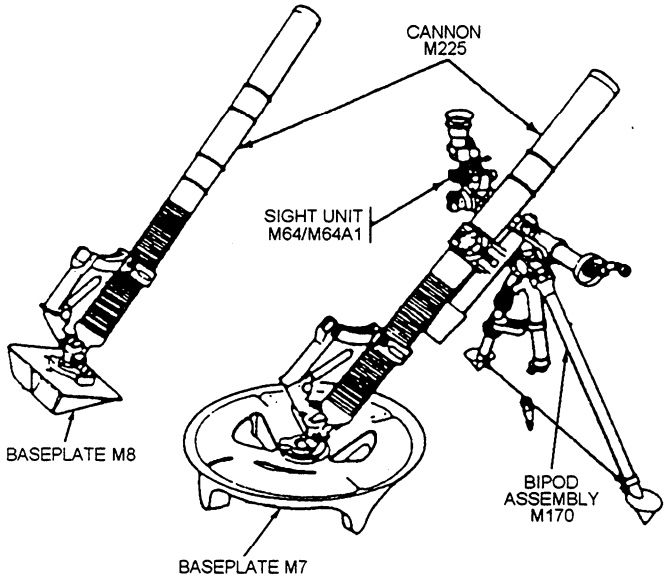


Figure 14-1.—The 60-mm lightweight mortar (M224).

A variety of shells and fuzes have been developed to make the 60-mm mortar a versatile weapon. It can be used as either an offensive or a defensive weapon.

GENERAL DESCRIPTION AND DATA

The mortar is a smoothbore, muzzle-loaded, high-angle-of-fire weapon. It consists of a mortar barrel with a baseplug and a fixed firing pin for drop firing. The mount consists of a biped with traversing and elevating mechanisms. A spring type of shock absorber absorbs the shock of recoil in firing. The baseplate is a unit that supports and aligns the mortar. For firing, the baseplug of the barrel is seated and locked into the baseplate with the barrel passing through the yoke of the biped mount and secured to the shock absorber. For transporting, disassemble the mortar into three groups: barrel, biped, and baseplate. This weapon may be transported by one crew member without disassembling it.

The mortar is fired by inserting a complete round into the muzzle, fin assembly down. The elevation of the barrel causes the round to slide toward the base of the barrel. On reaching the base, a propelling charge on the round is ignited by the firing pin. The pressure of the gas produced by the burning propelling charge drives the round up and out of the barrel. The fin assembly stabilizes the round in flight.

The mortar can deliver fire at ranges up to approximately 3490 meters. The sustained and maximum rates of fire are related to the type of round and charge being used.

The complete mortar weighs 46.5 pounds in the conventional mode and 18 pounds in the hand-held mode. This includes the cannon (14.4 pounds), the biped (15.2 pounds), and the M7 baseplate (14.4 pounds) and the M8 baseplate (3.6 pounds). The overall length is 40 inches.

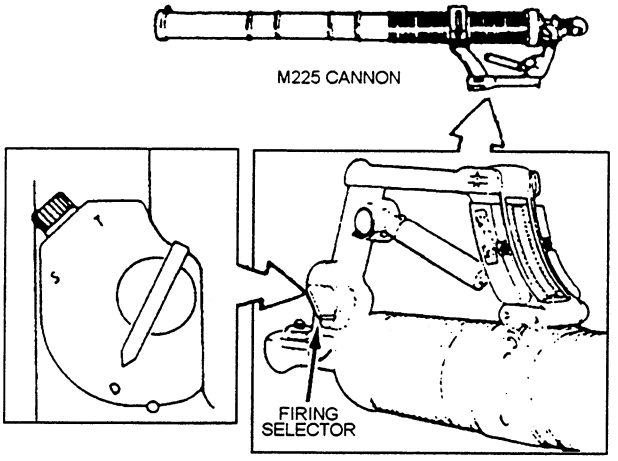


Figure 14-2.—M225 cannon.

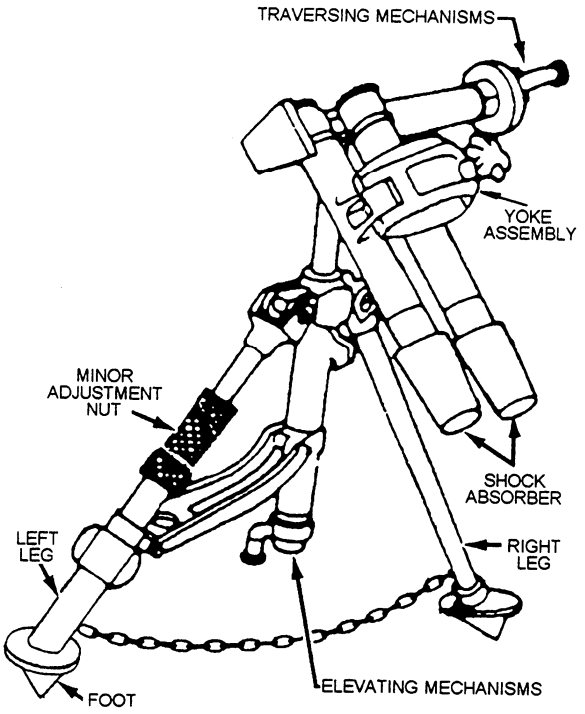


Figure 14-3.—Bipod assembly (M170).

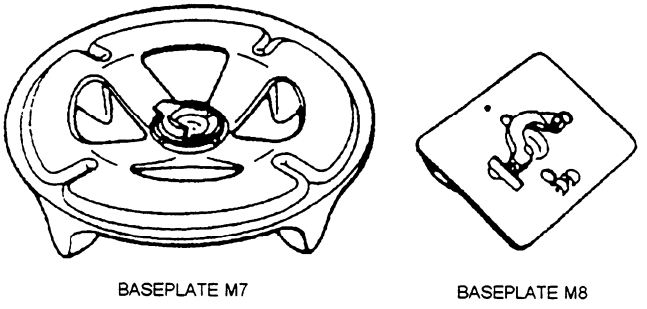


Figure 14-4.—Baseplate (M7 and M8).

ASSEMBLIES AND COMPONENTS

The barrel assembly used with the 60-mm mortar is the M225 cannon (fig. 14-2). It consists of a barrel, fire selector, firing pin, trigger, and range indicator. The lower portion of the barrel is externally threaded. The external threads provide extra cooling surface and also help to strengthened the barrel. The baseplug ends in a spherical projection that is flattened on two sides. The spherical projection fits into the locking cap of the M7 and M8 baseplates. The M224 has two firing modes: conventional and hand-held. Each mode requires different equipment and procedures.

CONVENTIONAL MODE

The BIPOD ASSEMBLY (fig. 14-3) consists of three major assemblies: the leg assembly, the elevating mechanism assembly, and the traversing mechanism assembly.

The BASEPLATE ASSEMBLY (fig. 14-4) is of one-piece construction and it supports and aligns the mortar for firing. The baseplate contains a rotating socket that holds the spherical projection of the barrel. The socket retaining ring holds the rotating socket in place. The open end of the socket MUST ALWAYS point in the direction of fire. The bottom of the baseplate has reinforced ribs that hold the baseplate in position after being seated in the ground.

In the conventional mode, the M7 baseplate, the sight unit (M64/M64Al), and the biped are used. The principle of this weapon is similar to the 81-mm mortar or any other mortar.

HAND-HELD MODE

The M225 cannon and M8 baseplate weigh approximately 18 pounds. This is a lightweight and highly mobile weapon that can be used in this mode on patrols with minimum deployment.

The SIGHT UNIT (M64/M64Al) (fig. 14-5) is the standard sight used with the 60-mm mortar. Once a sight has been calibrated on a mortar, it should always be used with that mortar. It is used for laying-in the mortar for elevation and deflection. The sight unit consists of a

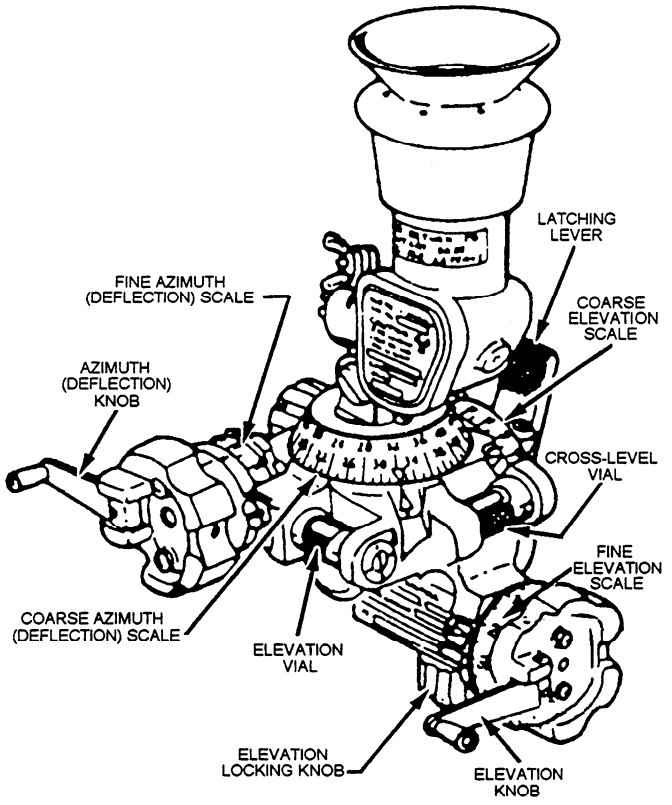


Figure 14-5.—Sight unit (M64/M64A1).

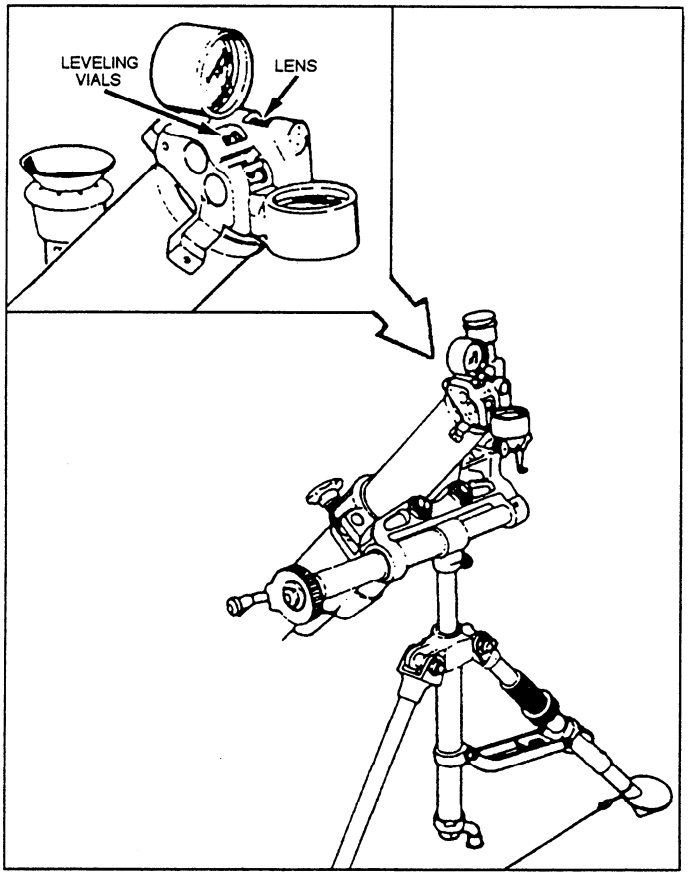


Figure 14-6.—Boresight (M115).

telescope mount and a nonmaintainable elbow telescope, fastened into one unit for operation. The elbow telescope provides magnification and a line of sight from which the mortar is aimed. The elbow telescope is a 1.5-power, fixed-focus telescope. The cross lines are at right angles to each other.

The TELESCOPE MOUNT consists of the lower, center, and upper parts. The lower part contains a locking lever latch, an elevation micrometer knob with scale, and an elevation locking knob. There is also a dovetail bracket located on the right side of the mount that mates with the dovetail slot located on the yoke of the biped. A semicircular, coarse elevation scale indicates from 700 to 1,600 mils in 100-mil increments.

The ELEVATION KNOB contains an elevation micrometer scale of 100 mils, numbered in l-mil increments from 0 to 100. Turning the elevation knob tilts the mount in elevation to the desired angle, as read on the coarse and micrometer elevation scales. The elevation locking knob prevents the elevation knob from rotating during firing.

The center part of the telescope mount has a deflection knob that rotates the mount for direction. A crank is provided on the knob for rapid deflection movement. The deflection locking knob locks the deflection knob during firing. The coarse deflection scale is fixed to the upper parts of the center section and has 64 graduations. This scale rotates with the upper part of the telescope mount. The coarse deflection slip scale is located adjacent to the coarse deflection scale. The micrometer deflection slip scale has 100 black graduations, numbered from 0 to 100 in increments of 1 mil. The M225 cannon, the M8 baseplate, and a heat protective mitten are all that is required to use this weapon in the hand-held mode.

The BORESIGHT (Ml15) (fig. 14-6) is used to calibrate the sight for the mortar. Since no two mortars are exactly alike, each sight MUST be calibrated on its own mortar. The body of the boresight contains three level vials. They are used to determine that the angle of elevation (preset at 800 mils) and to determine that the V-slides are in a perpendicular position.

THE AIMING POST (M1A2) is used with the mortar as an aiming point. Two aiming posts are provided for each mortar. These aiming posts can be separated in the center so as to be more compact when

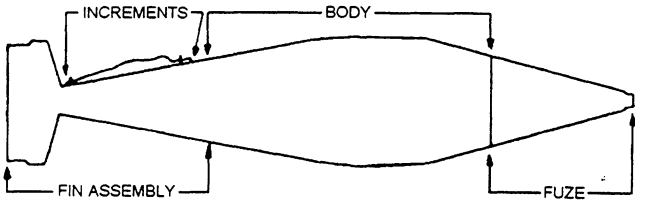


Figure 14-7.—A typical round of mortar ammunition.

being transported. There is a carrying bag made of canvas to hold each of the sections. The aiming posts are 8 feet long and 11/8 inches in diameter. They are painted with 5-inch red and white horizontal stripes to aid in sighting the mortar. The lower section of each aiming post has a pointed end to help place it in the ground. Most of these aiming posts become unserviceable because of improper use. These posts are hollow and can be easily bent if dropped. When positioning the posts in hard or frozen earth, you should loosen the ground with an entrenching tool before trying to seat them. Do NOT attempt to hammer the aiming posts into the ground. This may bend the sections or burr the connections, making the posts unserviceable.

The AIMING POST (M14) is used with the mortar as an aiming point. Two aiming posts are provided for each mortar. When positioning the posts in hard or frozen earth, you should loosen the ground with an entrenching tool before trying to seat them. DO NOT attempt to hammer the aiming posts into the ground. This may bend the sections or burr the connections, making the posts unserviceable.

The AIMING POST LIGHT (M58, GREEN AND M59, ORANGE) is used for night firing by clamping the light to the aiming post. You can only see the glow of the aiming post light from the direction of the mortar position. The colored lights aid the gunners in identifying their own aiming posts.

60-MM MORTAR AMMUNITION

Ammunition for the 60-mm mortar is issued in the form of "semifixed" complete cartridges (rounds). The term *semifixed* used in connection with ammunition signifies that the propelling charge is adjustable, and the round is loaded into the weapon as a unit. Except for the M69 training round, all 60-mm mortar rounds have three main assemblies: the fuze assembly, the body assembly, and the fin assembly (fig. 14-7). The M69 training round has no fuze assembly.

The body is the main component of the round and contains the material (explosive charge, illuminating charge, or smoke) that produces the desired effect of the round. The fuze assembly controls the method of exploding the shell. The fin assembly stabilizes the round in flight and causes the round to strike with the fuze end first. A propelling charge is attached to or near the fin assembly of the projectile.

When fired, the mortar round carries all of its components. Thus the mortar is ready to fire the next round. These rounds are shown in figure 14-8. The principal types of ammunition used in a mortar round are discussed in the topics that follow.

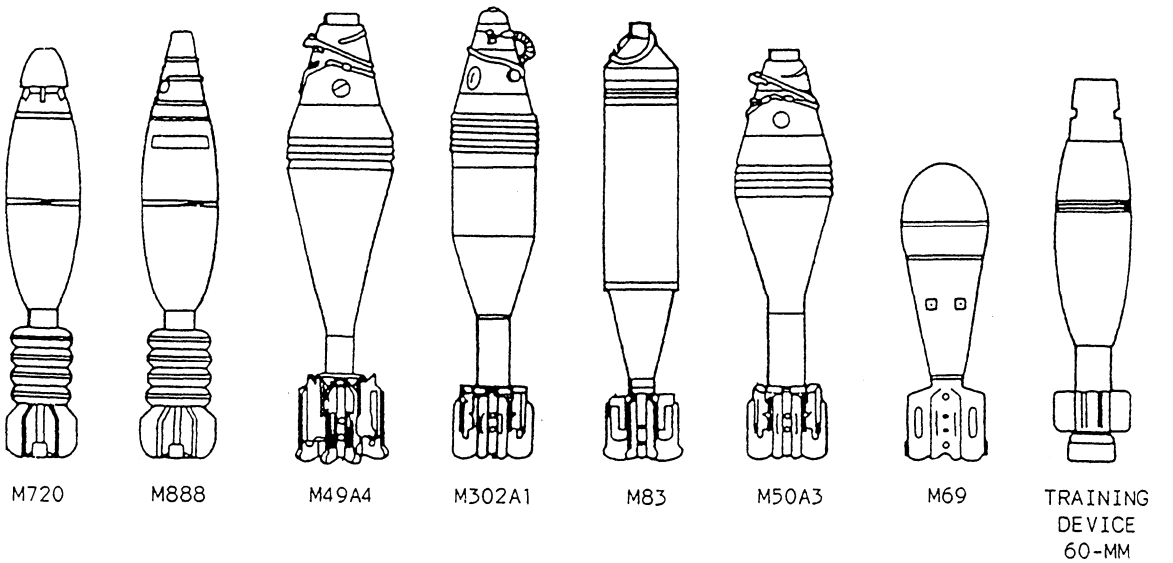


Figure 14-8.—Types of 60-mm mortar ammunition.

CARTRIDGE	OLD COLOR CODE	NATO STANDARD CODE
High Explosive (HE)	OD w/yellow labeling	OD w/yellow labeling
Smoke (WP) (FS)	Gray w/yellow labeling	Light Green w/red labeling
Illuminating (ILLUM)	Gray w/white labeling	White w/black labeling
Practice (TP)	Blue w/white labeling	Blue w/white labeling
Training	Black	Blue w/white labeling

Figure 14-9.—Ammunition color codes.

HIGH EXPLOSIVE (HE) AMMUNITION

High-explosive ammunition is used to destroy or cause casualties to enemy personnel, emplacements, and vehicles. High-explosive ammunition causes damage by blast, fire, and fragmentation of the metal body.

SMOKE, WHITE PHOSPHORUS (WP) AMMUNITION

White phosphorus ammunition is used for smoke screening, casualty-producing, incendiary (burning) action, and signaling. The WP rounds cause material damage by fire when the white phosphorus burns.

ILLUMINATING AMMUNITION

Illuminating ammunition contains a flare attached to a parachute and is used for battlefield illumination and signaling.

TRAINING PRACTICE (TP) AMMUNITION

This type of ammunition is used for target practice firing. The training practice (TP) round is used for training mortar crews in the handling and firing of live ammunition. This round is similar to the high-explosive round, but it does not have a high-explosive filler in the body. It has only a small spotting charge to mark the point where the round hits the ground.

TRAINING AMMUNITION

The training round is provided for training mortar crews in loading and firing the mortar. This round is completely inert and has no fuze. The propelling charge for the training round cannot be varied. This round is fired on training ranges at reduced distances. It is propelled only by an ignition cartridge up to a range of 275 meters.

IDENTIFICATION OF AMMUNITION

All mortar rounds are painted to prevent rust and to provide an easy means of identification. The color of the body identifies the classification of the round according to tactical use. The information stenciled on the round provides detailed information concerning that particular round.

Color codes of ammunition have been modified by NATO agreement. Until ammunition manufactured before this agreement has been expended, the user must know both codes. The old and new codes are shown in figure 14-9. Along with color codes, each round has the following information (fig. 14-10) stenciled on its body:

1. Caliber of mortar in which the round is to be fired (60 mm).

2. Type of filler (TNT, Comp B, Smoke WP, Illum).

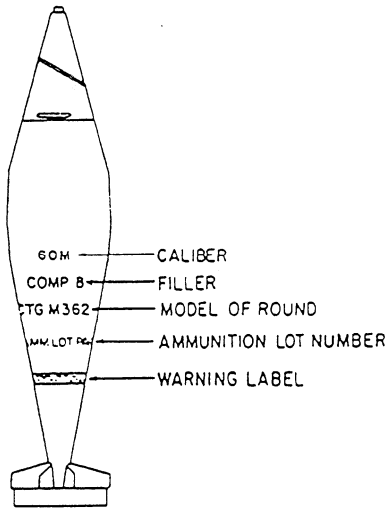


Figure 14-10.—Markings on rounds.

3. Model of round (Cartridge M888, M49A4, M302A1, M83, etc.).

4. Ammunition lot number (AMM LOT PA-36-339). This is a number assigned to identify each group of rounds manufactured.

5. Warning label, if required. Some rounds have a warning label fixed on the body of the round. This warning label specifies the maximum propellant charge to be used when firing these rounds in the 60-mm mortar.

FUZES

The fuzes used on mortar rounds are designed to activate the fired round at the desired time or place (fig. 14-11). There are three types of fuzes used with the 60-mm mortar ammunition: impact, graduated time, and variable time.

The IMPACT FUZE causes the round to function when it comes in contact with an object. Impact fuzes can be either point detonating (PD) or base detonating. Point-detonating fuzes that function immediately upon impact are called superquick (SQ). Point-detonating fuzes that have some penetration into the ground before functioning are called quick (Q). Point-detonating fuzes that enter the ground before functioning are known as delay (D).

The GRADUATED TIME FUZES cause the round to function at a prescribed (set) time after the round is fired. Graduated time fuzes may function at the prescribed time only. These fuzes are known as time (T) fuzes. Graduated time fuzes may also have an impact element that causes the fuze to function on impact if it does not function at the set time. These fuzes are known as TIME AND SUPERQUICK (TSQ) FUZES.

The VARIABLE TIME FUZES have their own radio transmitter and receiver. They transmit a radio signal. This signal is reflected back to the fuze. As the fuze (round) approaches an object, the strength of the

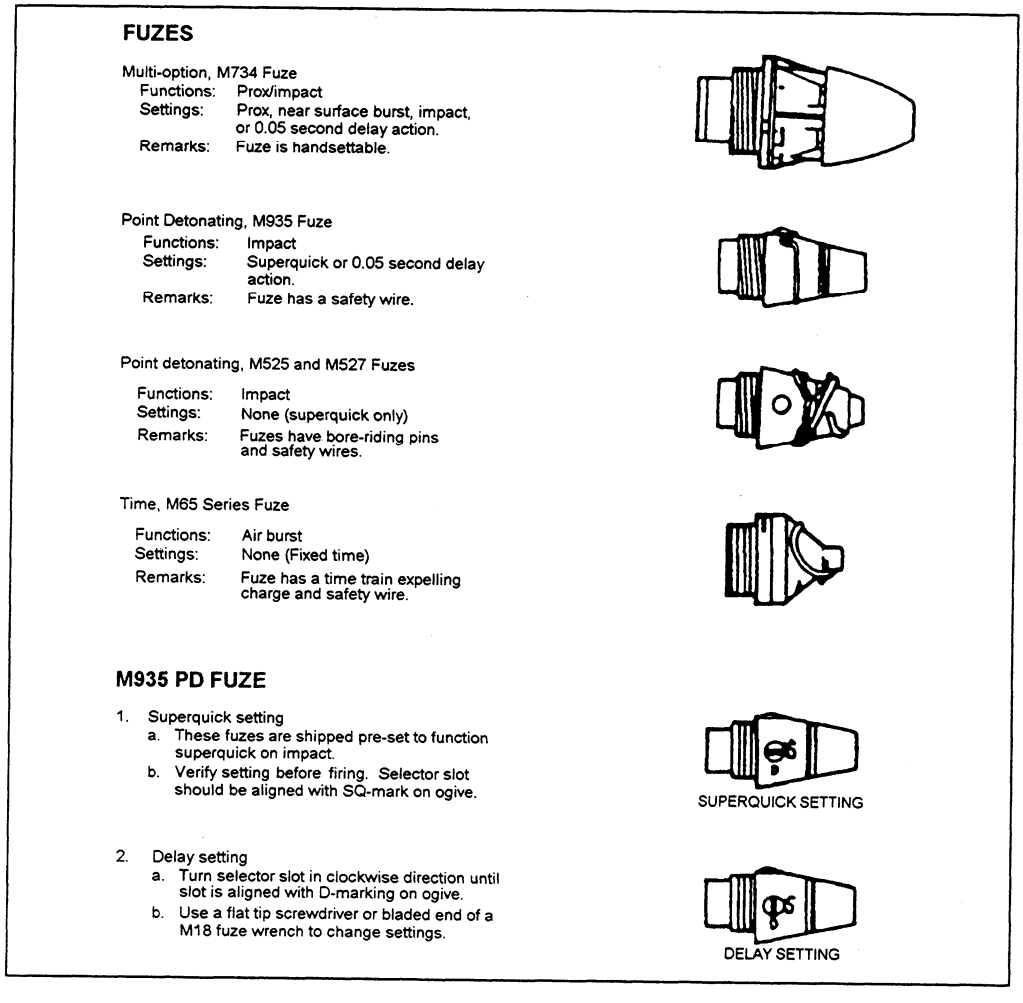


Figure 14-11.—Fuzes.

reflected signal increases. When the returning signal reaches a predetermined strength, the fuze explodes the round. These fuzes are known as proximity or VARIABLE TIME (VT) FUZES. The object that reflects the signal is not necessarily the target. It maybe any object that can reflect the signal. The VT fuze explodes at a height of about 1 to 6 meters over normal terrain; however, the better reflecting surfaces cause the fuze to explode at a higher height and the poorer reflecting surfaces at a lower height. Trees increase the height of burst. Even clouds have caused the fuze to detonate.

MORTAR SQUAD EQUIPMENT

Each member of the mortar squad is responsible for certain equipment used in placing, firing, and maintaining the 60-mm mortar. Leaders must conduct frequent inspections to ensure that proper maintenance is available for this equipment.

Mortar Squad Leader. The squad leader is responsible for all equipment issued to his squad. In addition, this person carries the following items: a pair of binoculars, a flashlight, and two baseplate stakes. The baseplate stakes, similar to a surveyor's hub stake, are an optional item. When the squad does not have a communicator attached, the squad leader must also carry a radio or field telephone and wire.

Gunner (Crew Leader). The gunner is responsible for all equipment issued to his crew.

Assistant Gunner. The assistant gunner is responsible for loading the mortar. He also carries several rounds of ammunition.

Ammunition Bearer Number 1. He carries several rounds of ammunition.

Ammunition Bearer Number 2. He carries several rounds of ammunition.

POSITIONING THE MORTAR

Normally, the combat mission of the construction battalion, and especially that of the mortar platoon, is of a defensive nature. The mortars are set up within the perimeter of the camp in improved, permanent positions. The ammunition and equipment are kept nearby in readiness. However, the unit commander does have authority to deploy these weapons in offensive missions and the following procedures relate to this type of deployment. By learning these simple procedures, a well-trained crew should be able to prepare a mortar for firing in approximately 1 minute.

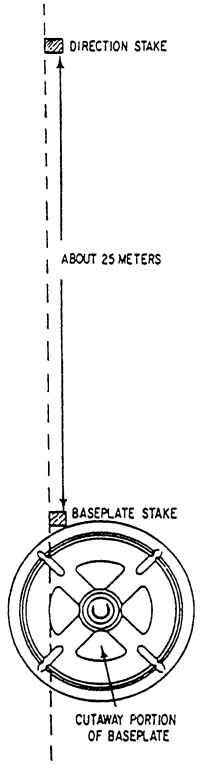


Figure 14-12.—Placing baseplate against baseplate stake.

Direct the initial fire of the mortar to the center of the target sector. The initial direction of fire is determined by the section leader or given to them by the forward observer (FO) or by the fire direction center (FDC). The section leader points out the mortar position and announces the direction of fire to the squad leader. The squad leader then places a baseplate stake where the baseplate is to be positioned. The squad leader then places a lensatic compass on the baseplate stake and rotates the compass until he can sight along the determined direction. He directs the ammo bearer to place a direction stake into the ground at least 25 meters from the baseplate stake along their line of sight. After the direction stake has been placed, the number 1 ammunition bearer for the squad places the outer edge of the baseplate against the baseplate stake, so the left edge of the cutout portion of the baseplate is aligned with the left edge of the stake (fig. 14-12).

PREPARATION FOR FIRING

Emplace the baseplate by standing on it and rocking back and forth. Rotate the locking cap until the opening in the cap points in the direction of the target. Place the base of the cannon into the cap opening. Rotate the

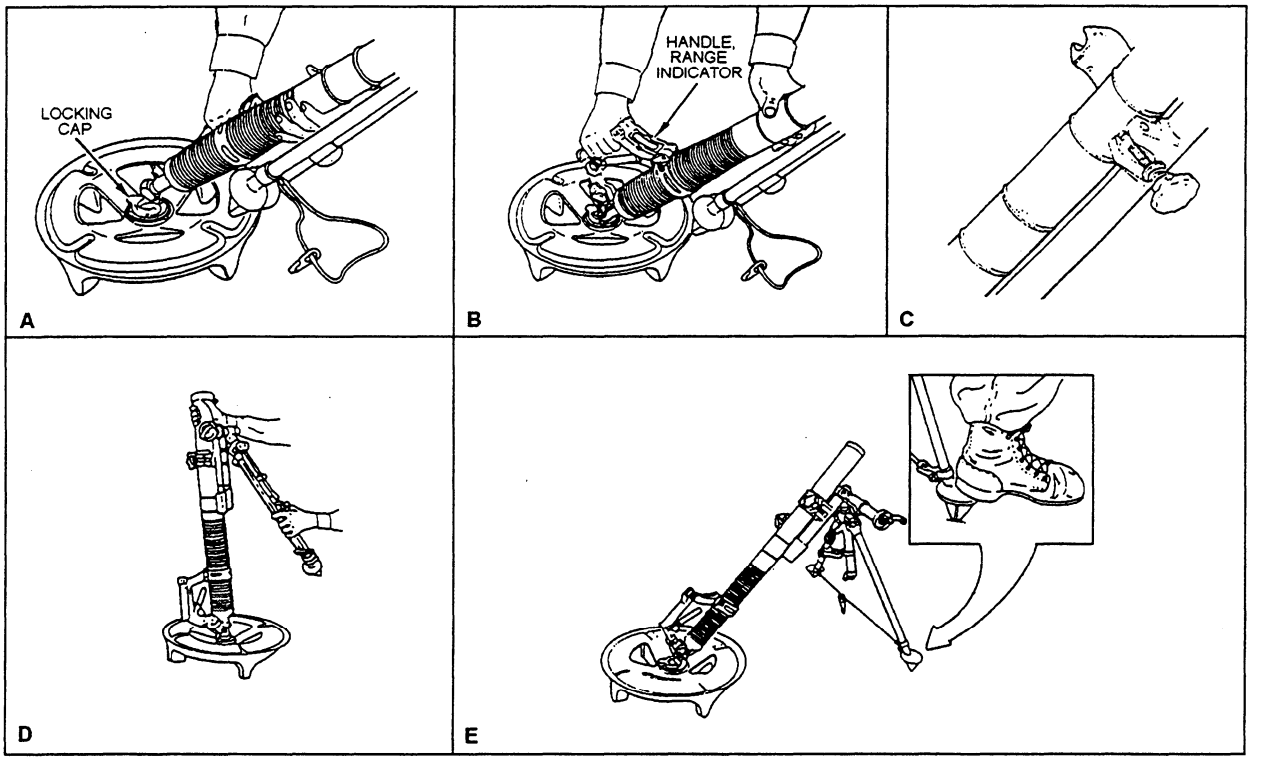


Figure 14-13.—Preparation for firing.

cannon one-fourth turn, so the handle is in an upward position (fig. 14-13, views A and B).

Loosen the knob on the biped, and swing it downward. Open the collar. There are two saddles on the M225 cannon for positioning the biped. The upper saddle is used for elevations of 1,000 roils or less and the lower saddle for elevations greater than 1,000 roils. (The upper saddle must be used for boresighting this weapon). Place the upper or lower saddle of the cannon into the collar of the biped (fig. 14-13, view C). The handle and firing mechanism assemblies are straight-up on the top of the barrel. Close the collar and swing the knob into place and tighten. Hold the barrel in a vertical position, and pull the legs of the biped up to unlatch and swing out (fig. 14-13, view D). Unfasten the hook and cable. Loosen the coarse cross-leveling nut and spread the legs. When the biped is attached to the upper saddle, set the feet about 1 1/2 feet in front of the baseplate. When the biped is attached to the lower saddle, set the feet about 1 foot in front of the baseplate. Press the biped feet firmly into the ground (fig. 14-13, view E). With the coarse cross-leveling nut still loose, adjust the cross-leveling mechanism until the elevating mechanism is nearly vertical. Cross-leveling removes cant from the weapon. Hand tighten the nut. Adjust the fine cross-leveling nut clockwise to move the elevating mechanism to the left or counterclockwise to move the elevating mechanism to the right, until it is vertical. Now, remove the sight unit (M64/M64A1) from its case. Press the latching lever while installing the sight unit on the biped. Release the latching lever and check to see that the sight unit is firmly locked to the biped. The gunner sets the deflection scale at 0 mils and the elevation at 1,000 mils. He then centers the elevation bubble and cross-levels the mortar. The mortar is now mounted and ready to be laid.

When more than one mortar is to be used for a mission, it is important that they be mounted and laid parallel. This ensures proper target coverage and accurate destruction of targets when they are engaged.

LAYING A MORTAR USING THE COMPASS METHOD

Several methods are used to lay mortars parallel. The most rapid, but the least accurate, method is by using a compass. In this method the section leader stands approximately 6 feet behind the mortar and sights through the compass at a given direction. The section leader then directs the gunner to move the lay of the barrel left or right until the barrel and the sight wire of the compass are lined up. At this time the gunner

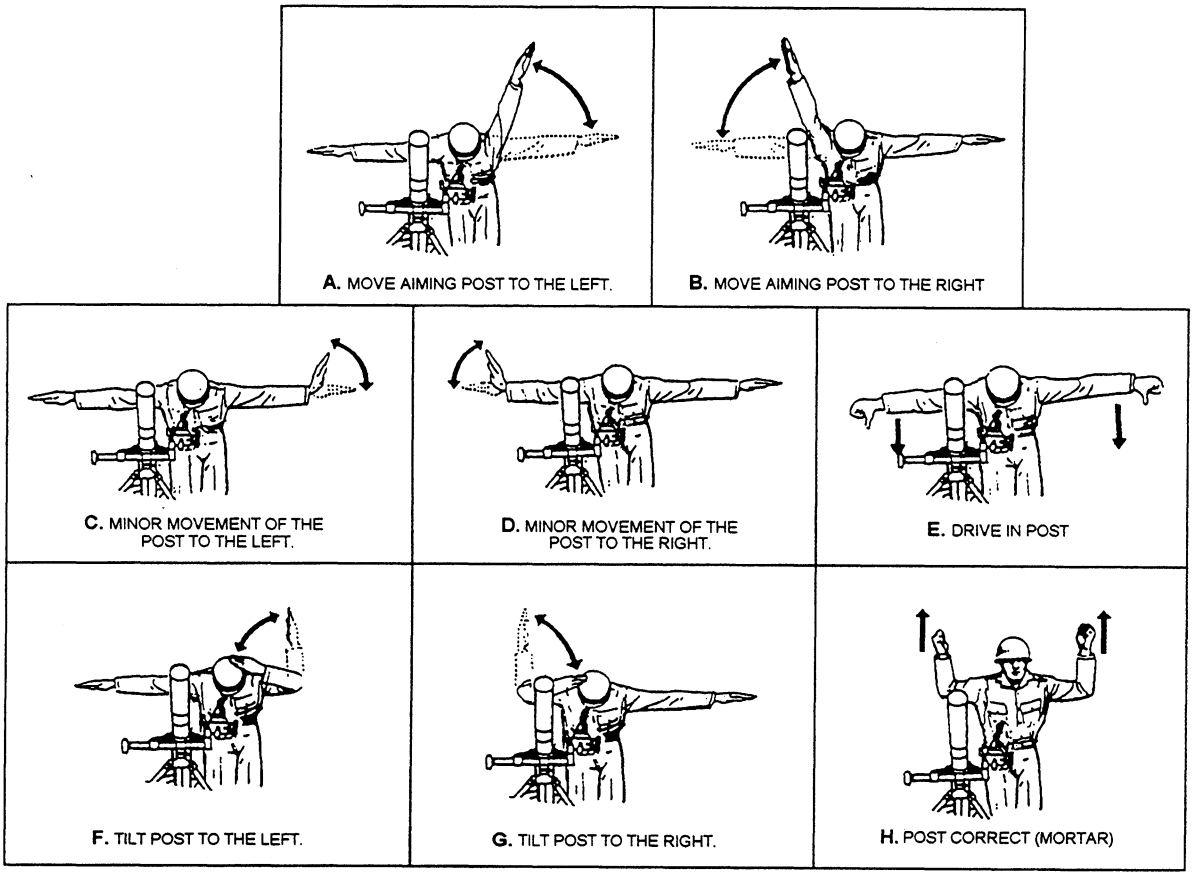


Figure 14-14.—Arm-and-hand signals used in placing out aiming post.

rechecks to see that all level vials are centered. When the center of the barrel and the sight of the compass are in line and all bubbles level, the gun is laid. The section leader then directs the gunner to refer the sight and put out their aiming posts. "Refernng the sight" means making a deflection change on the sight without moving the mortar. To refer the sight, you turn the deflection knob until the given deflection is set on the sight. When using the M64/M64A1 sight, you can place the aiming posts where they can best be observed because the deflection scale can be slipped to read the desired deflection. The sight (M64/M64Al) is initially referred to a O-nil reading, and the aiming posts are set on that deflection.

PLACING AIMING POSTS

Normally two aiming posts are placed out to establish the aiming line. The rounds are fired from the mortar in reference to this line. After the mortar has been mounted and laid on the direction stake, the sight is normally refereed to 2,800 mils, and the aiming posts are placed along this line of sight. The aiming posts are placed on the new line of sight by the first ammunition bearer, observing the arm-and-hand signals (fig. 14-14) of the gunner. The posts are called the far post and the near post. The far post is placed out 30 to 50 meters from the mortar, and the near post is placed at 15 to 30 meters (fig. 14-15). When this is not possible, because of terrain or situation, the post should be placed out as far as possible, keeping in mind that the distance between the two posts must be equal. The far post is always placed first and the near post last. When these two posts are seen through the sight, they appear as one. This is called

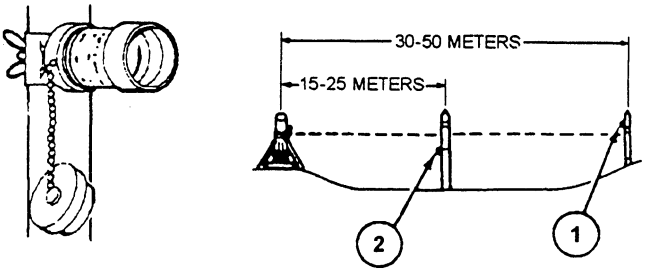


Figure 14-15.—Aiming post and lights (M58/M59).

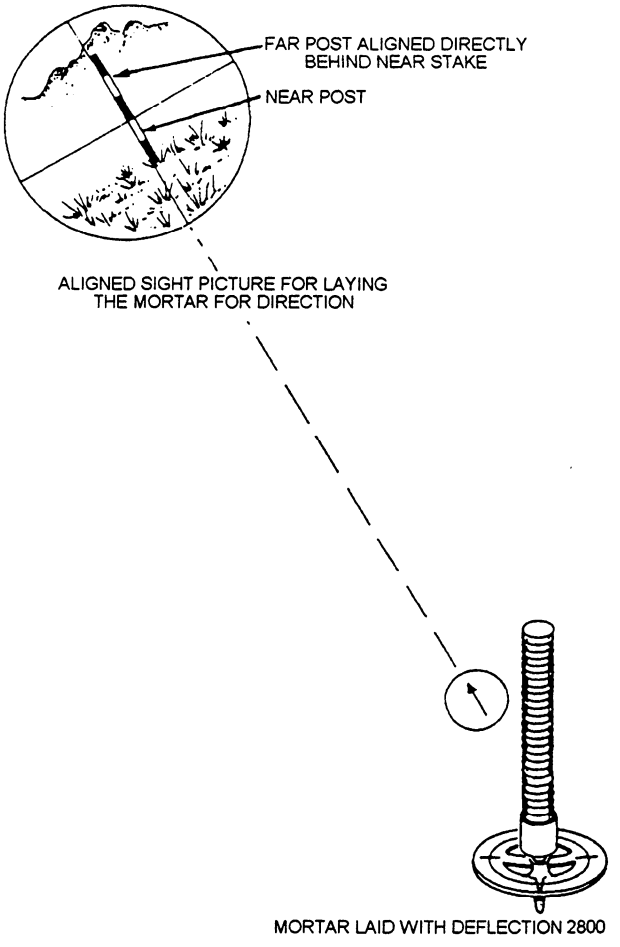


Figure 14-16.—Aligned sight picture.

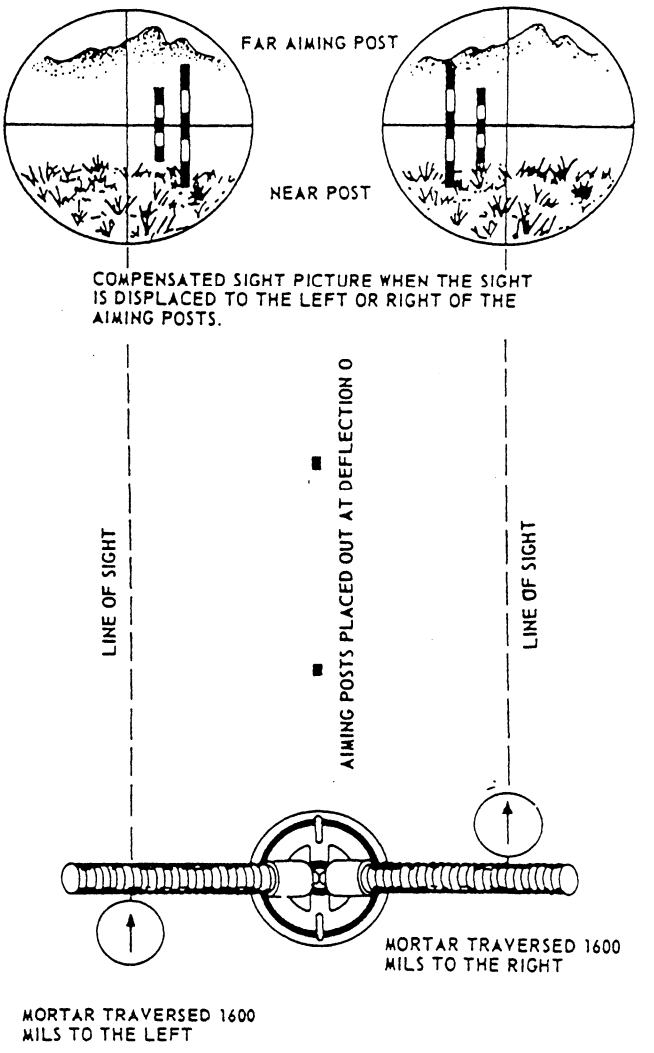


Figure 14-17.—Compensated sight picture.

the ALIGNED sight picture (fig. 14-16). If the two aiming posts do not appear as one, displacement of the sight or the baseplate has occurred. This separation is caused by one or two things: either (1) a large deflection shift that moves the entire sight out of the plane passing through the aiming posts; or (2) a lateral (left or right) displacement of the baseplate caused by the shock of firing, which also moves the sight out of the plane of the aiming post. When both the far post and the near post are visible, it is called a COMPENSATED sight picture (fig. 14-17).

MASK CLEARANCE

Mask clearance is the clearance required for firing the weapon without danger of a premature detonation of the round by obstructions, such as trees, hills, or buildings. After the mortar is mounted, the gunner must determine the minimum and the maximum mask clearance. This determination helps to ensure troop safety at the mortar position and also helps the fire direction center (FDC) to know whether or not a particular mission can be completed with that mortar.

To determine mask clearance, the gunner sets the sight at 0 deflection and 0 elevation, making the line of sight parallel with the axis of the bore. The gunner then raises or lowers the barrel until the cross hairs of the sight just touch the obstruction (tree, hill, etc.). The gunner then levels the elevation bubble by turning the elevation knob on the sight and reads the elevation from the elevation scale. This reading is the minimum (or maximum, depending on the location of the obstruction) mask clearance. For a safety factor, 30 mils is added to (or subtracted from) the elevation reading.

Mask clearance must be determined in a complete circle around the mortar to every object that could interfere with firing. The gunner reports all these figures, stating the azimuth and clearance to the squad leader and FDC. He also keeps a record for himself.

In emergency situations, where time is extremely important, the gunner can quickly determine the mask clearance for any given target by placing his head near the baseplug and sighting along the top of the barrel. When the line of sight clears the mask, it is safe to fire. Of course, it takes considerable time to sight this way before every fire mission; therefore, at the first opportunity, determine the minimum and maximum clearance by using the sight and then record it.

SIGHT PICTURE

The gunner can only have one of two sight pictures when the mortar is fired: either the ALIGNED sight picture or the COMPENSATED sight picture. To use the aligned sight picture correctly, the gunner must lay the vertical line of the sight reticle, so it just touches the left side of the visible aiming post (fig. 14-16).

To use the compensated sight picture correctly, the gunner must lay the vertical line of the sight reticle, so the left edge of the far aiming post is placed exactly midway between the left edge of the near aiming post and the vertical line of the sight reticle. This corrects for displacement of the sight (fig. 14-17).

SIGHTING

The gunner is responsible for setting the mortar to the correct deflection and elevation. Remember, when the gunner lays the mortar, the sight is first set for deflection then for elevation, while the mortar is first laid for elevation then deflection. You can readily remember this sequence by keeping in mind the key word *DEED.*

1. Place Deflection on sight
2. Place Elevation on sight
3. Level for Elevation
4. Level for Deflection

For example, we will use the fire command for an HE round at a deflection of 2,700 mils, charge two, and an elevation of 1,150 mils. Assume the mortar is facing the principal direction of fire and the sight is aligned with the aiming posts at a deflection of 2,800 mils.

Setting the Sight

The gunner first sets the new deflection of 2,700 mils on the sight unit. To do this, the gunner rotates the deflection knob counterclockwise until the index points to 2,700 on the deflection scale and to 0 on the micrometer scale. Notice that moving the knob counterclockwise has moved the sight to the left. A clockwise movement would move the sight to the right.

The gunner should always keep in mind that the barrel moves in the opposite direction of the sight. In addition, the gunner must know in which direction the barrel is pointing after a given deflection change.

Any deflection command that causes the barrel to be moved over 90 degrees either right or left of the principal direction of fire (PDF) is always given as a REAR deflection. (For example: DEFLECTION REAR TWO-SEVEN-HUNDRED.) Notice that a rear deflection is directly opposite the equivalent FRONT deflection. Any deflection without the command REAR is understood to be FRONT.

After rotating the sight to the new deflection of 2,700 mils, the gunner sets the new elevation by rotating the elevation knob until the index on the elevation scale points between 1,100 and 1,200, and the index of the elevation micrometer is pointed at 50 nils.

Laying for Direction

As the deflection placed on the sight is greater than 95 mils, it cannot be made by turning the traversing crank. Therefore, the gunner assisted by the assistant gunner must lay the barrel in the new direction of fire by moving the biped. Whenever the biped is moved in this manner, the gunner should always rotate the barrel to the center of the mechanism to give maximum flexibility at the new setting. As a rule of thumb, the biped should always be moved whenever the new deflections more than 20 mils either side of center. Care should be taken in moving the biped to get roughly within two turns (20 mils) of the aiming posts to avoid excessive traversing.

With the barrel in its new position and the vertical cross hair aligned with the left edge of the aiming posts again, the gunner next levels the barrel for elevation by turning the elevating crank until the bubble of the elevation level is centered. The gunner then turns the adjusting nut of the cross-leveling assembly until the cross-level bubble is centered. After a final check with the aiming posts, the mortar is now laid in the new direction of fire and is ready for firing.

FIRE COMMANDS

Fire commands originate with the computer at the FDC or when the mortars are used without an FDC, with the leader at the observation post. These commands contain the technical instructions that enable the gunners to lay the mortars for deflection and elevation.

It is often desirable to transmit fire commands in fragmentary form as the elements of the command are determined. When transmitted in this manner, the command can be executed while it is being issued. Whenever practical, fire commands are given orally. When it is not practical to give oral commands in person, telephone or radio maybe used. The gunners repeat the elements of every fire command as they receive them. There are two types of fire commands: the initial fire command and the subsequent fire command.

NOTE: All fire commands, initial and subsequent, are repeated by the gunner.

The elements of both follow a definite sequence; however, subsequent commands include only such elements as are changed, except that elevation is always announced.

Initial Fire Command

The initial fire command consists of the data necessary to fire the first round. There are eight elements of the initial fire command which are as follows:

1. MORTARS TO FOLLOW. (Alerts the firing element.)

2. SHELL AND FUZE. (Specific ammunition type and fuze to be used.)

3. MORTAR TO FIRE. (Designates the specific weapon or weapons to fire. Each weapon has a different number.)

4. METHOD OF FIRE. (Indicates the number of rounds to be fired and any special instructions.)

5. DEFLECTION. (The word *deflection* always precedes the sight setting. This element gives the exact deflection required to engage the target.)

6. CHARGE. (This element is announced by CHARGE and followed by the desired number.)

7. TIME. (This element provides the fuze setting for the illuminating rounds. Omit this element for HE rounds.)

8. ELEVATION. (Elevation is given in roils preceded by ELEVATION. Elevation is the authority to fire except when the method of fire includes the statement AT MY COMMAND.)

Subsequent Fire Command

The subsequent fire command contains changes to the initial fire command data. Subsequent commands include only those elements that have changed except that elevation is ALWAYS announced, changed or not. Changes in direction are given in total deflection; for example, to change deflection from 2,700 to the left 50 roils, the leader would give a subsequent command of DEFLECTION TWO-SIX-FIVE-ZERO. When a change is made in mortars to fire or in the method of fire, the leader gives a subsequent command that includes both elements to avoid a misunderstanding.

Action

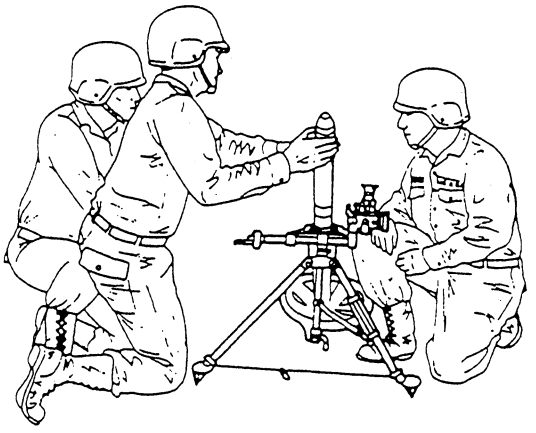
As soon as the gunner receives and repeats the command, he begins setting the designated deflection and elevation on the sight unit. The number 1 ammo bearer, as soon as the gunner repeats the command, prepares the round for firing and hands it to the assistant gunner who does the actual loading. By the time the mortar is laid to the direction, the ammunition should be ready for loading.

PREPARING THE AMMUNITION

When the fire command is issued, the first ammunition bearer prepares the ammunition for firing.

Continuing with our example fire command, the gunner selects an M888 HE round. As this round is normally fuzed with the M734 fuze, the ammo bearer must first remove this fuze and replace it with the proximity fuze as designated in the fire command. To do this, he removes the fuze with the M18 fuze wrench. He then takes the proximity fuze from its container and inspects the threads to ensure they are in good condition. The fuze is then inserted into the fuze cavity of the projectile and manually screwed in by grasping the base of the fuze. Using the fuze wrench, he tightens the fuze until no clearance exists between it and the body of the projectile.

With the new fuze installed, the ammo bearer next adjusts the propellant charge. The fire command called for a CHARGE TWO. As the M888 HE round is issued



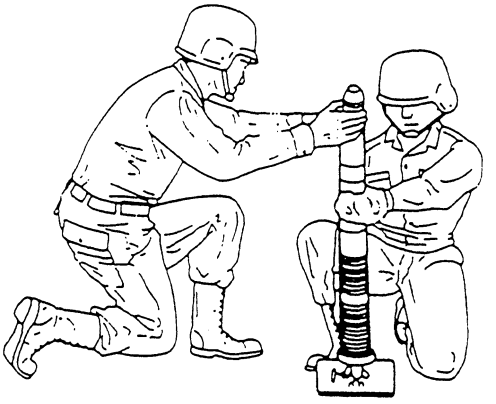


Figure 14-19.—Firing position: Hand-held mode.

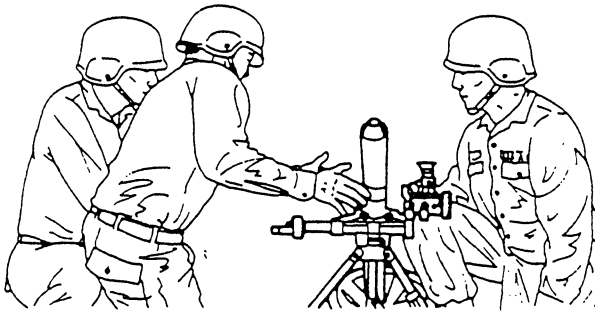


Figure 14-18.—Firing position: Conventional mode.

with a total of four propellent increments, he must remove two of these.

After the round is prepared for firing, do NOT try to change the fuze. The ammo bearer removes the safety (cotter) pin and passes it to the assistant gunner who does the loading.

LOADING AND FIRING

In the drop-fire method (conventional mode), as soon as the gunner ensures that the mortar is laid correctly, he removes the sight unit and sets the selector to the D (drop) position. This is done only for the first three rounds or until the baseplate is settled, at which time the sight may stay on the mortar while firing.

The gunner kneels on the left side of the cannon and looks into the sight unit. The assistant gunner kneels on the right side in front of the traversing mechanism, facing rearward. The ammunition handler kneels beside the assistant gunner slightly to the rear (fig. 14-18).

The ammunition handler adjusts the propellant charge for the desired range, sets the fuze for the desired burst effect, removes the safety wire/pin, and hands it to the assistant gunner. As the example fire command stated earlier, the method of fire is ONE ROUND AT MY COMMAND; the gunner cannot fire until given the command. When the gun is ready to fire, the gunner notifies the FDC or squad leader that the gun is UP. The gunner then kneels in an upright position. The next command that the gunner receives is HALF LOAD. As the gunner repeats the command, the assistant gunner grasps the body of the round with two hands near the center of the round. He inserts it, fuze end up, into the muzzle beyond the narrow part of the body.

CAUTION

If a crew member is within one meter of the muzzle during firing, hearing protection must be used.

At the command FIRE, the assistant gunner releases the round, passes his hands partly down the outside surface of the barrel while pivoting to his left and bending toward the ammunition handler.

When the firing selector is set at the T (trigger) position, the gunner squeezes the trigger after the round hits bottom on the command to FIRE.

The hand-held mode (fig. 14-19) requires no sight unit. The range indicator assembly is used to estimate target range. Use of the range indicator is for M720/M888 cartridges only. As the gunner kneels directly behind the barrel, he places a glove on his left hand to hold the barrel. Next, he puts his right hand on the trigger/handle and points the mortar toward the target. At this time, the gunner reads the range indicator.

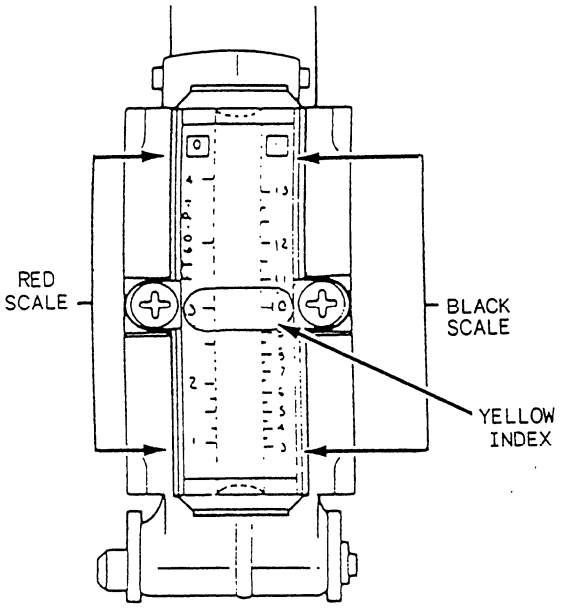


Figure 14-20.—Range indication.

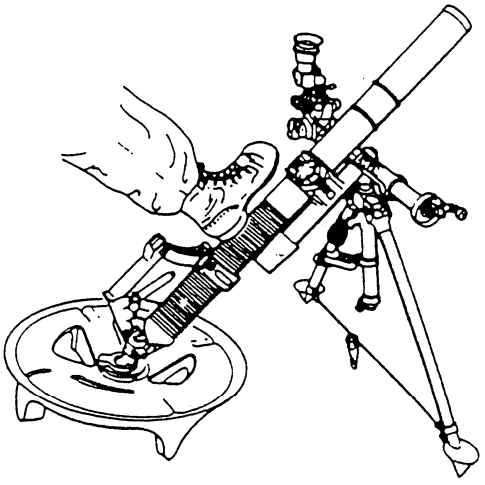


Figure 14-21.—Misfire procedure: Dislodging the round.

The range indicator (fig. 14-20) consists of a vial that contains a ball that moves when the cannon is elevated or depressed to indicate the firing range.

The black scale is for charge one; the red scale is for charge zero. The yellow index (range 3 on the red scale and range 10 on the black scale) is a warning reminder to brace the baseplate before firing.

The ammunition handler prepares the cartridge. As the gunner sets the firing selector in the T (trigger) position, the assistant gunner inserts the round into the muzzle, releases the round, and assumes a safe position. The gunner lays-in the weapon by using the range indicator and sighting over or on the side of the muzzle for the azimuth. Holding the mortar steady, the gunner assumes a safe firing position. When the weapon is on target, the gunner squeezes the trigger to fire, then releases the trigger in preparation for the next round.

MISFIRES

A MISFIRE is a round that has been inserted in the mortar but has failed to fire. A misfire is a complete failure to fire. It may be caused by a faulty firing mechanism or a faulty element in the propelling charge explosive train. A misfire in itself is not dangerous, but since it cannot be immediately distinguished from a delay in functioning of the firing mechanism or from a hangfire, it must be handled with care. Mechanical malfunctions may be caused by a faulty firing pin, rounds lodging in the barrel because of burrs, excess paint, oversize rounds, or foreign matter in the tube.

A HANGFIRE is a round that gets lodged in the barrel for one reason or another, and the round does not strike the firing pin. Thus a hangfire cannot be distinguished immediately from a misfire. Any round that fails to fire should be treated as a misfire. When a firing malfunction occurs, any member of the squad noticing that a misfire has occurred immediately announces MISFIRE. When conditions permit, the mortar crew should wait approximately 1 minute before attempting to clear the misfire. This waiting period may avoid an accident, caused by a delayed action of the ignition cartridge. If the barrel is excessively hot, it should be cooled to avoid cooking off the misfire. Wet sandbags or water or both maybe used to cool the mortar barrel. All persons not actively engaged in clearing the misfire should be kept at a safe distance until the misfire has been removed.

The above procedures are similar for both the conventional mode and the hand-held mode. The major difference is the support needed for the M225 cannon, since the hand-held mode is without a biped. Sandbags, empty ammo boxes, or anything else that will furnish the required support may be used to maintain safe elevation of the muzzle.

If a misfire occurs, the gunner sets the fire selector to the T (trigger) position and squeezes the trigger twice to confirm the malfunction. If the weapon fails to fire after the second try, any crew member noticing it announces MISFIRE. The gunner changes the firing selector to the S (safe) position, and then kicks the lower portion of the cannon (fig. 14-21). This is to dislodge

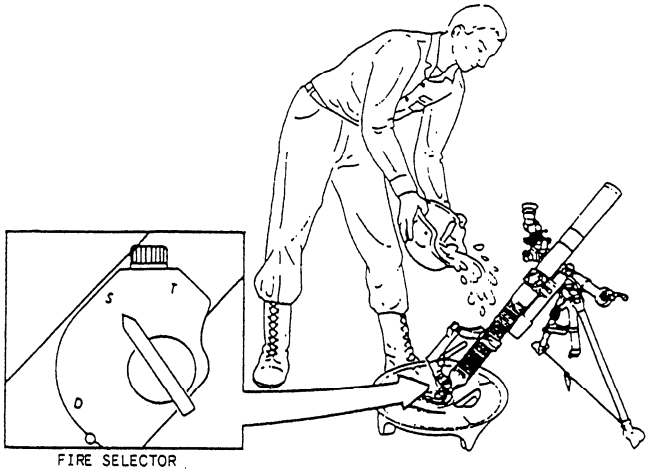


Figure 14-22.—Misfire procedure: Cooling the barrel.

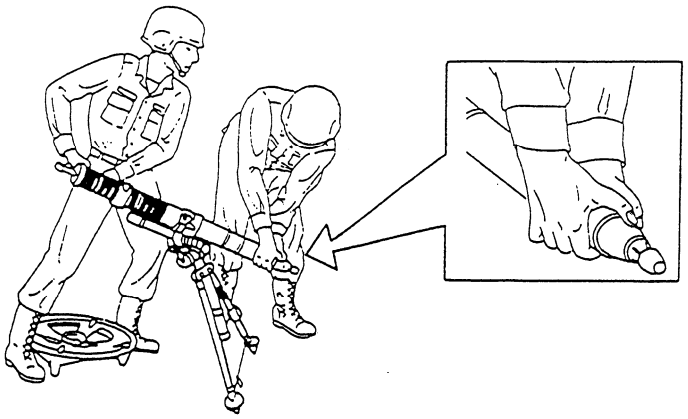


Figure 14-23.—Misfire procedure: Removing the round.

the round. The gunner ensures the weapon is aimed down range, changes the fire selector to T (trigger) position, then squeezes the trigger. The round should fire. If it does not, he returns the selector to the S (safe) position and keeps the muzzle elevated and pointed down range. He then allows the outer surface to cool. This can be done by using water (fig. 14-22) or just allowing the air to cool it until the cannon can be handled with bare hands. The gunner lifts the base cap end (fig. 14-23) of the cannon, and the assistant gunner places his hands around the outer edge of the muzzle. As the base cap end is lifted, the round should slide out. The assistant gunner stops it with his thumbs, then removes the round from the bore and places it in the designated area.

CAUTION

Never put your hands in front of the muzzle.

CARE AND CLEANING

The mortar squad members are responsible for the care and cleaning of the gun. Basically, each member is responsible for the part of the gun that he carries.

A schedule should allow time for supervised cleaning on each day the mortar is fired and once weekly when it is not in use.

General Cleaning

To clean the bore, attach cotton waste or rags to the cleaning staff and insert them into the bore. Move the staff in and out several times with a turning motion. Replace the dirty rags with clean rags. This cleaning removes accumulations of dust, dirt, and thickened oil. Repeat this procedure until the cotton waste/rags comes out clean. When necessary, wash the outside of the barrel with a soap solution, rinse it with clean water, dry it, and apply a light coat of preservative lubricating oil. You must be careful to rinse and dry all parts of the mortar thoroughly after using soap and water.

CAUTION

When cleaning the bore, be careful not to leave any waste on the firing pin.

To clean the firing pin, remove it by using an Allen wrench. Insert the firing-pin vent cleaning brush into the vent. While exerting light pressure, turn the brush clockwise to remove excess foreign material from the shoulders of the vent. Clean the shoulders carefully, because the firing pin does not seat correctly when there is foreign material left on the shoulder. This results in gas leakage while firing. Next, wrap a rag around the vent cleaning brush and insert it into the firing pin vent. Clean the vent by moving the rag back and forth through it. Replace the dirty rag and repeat this procedure until the rag comes out clean; then saturate the clean rag with preservative lubricating oil, and push it in and out of the vent. Next, clean the firing pin, oil it lightly, and properly reseat it into the baseplug.

To clean the mount, keep all parts of the biped and baseplate clean and free of foreign matter. Keep all moving parts and polished surfaces lightly coated with oil. Use a small paintbrush or toothbrush to clean the screw threads and crevices. To remove moisture and dirt from the metal surfaces, rub them with a dry cloth; then wipe them with a cloth containing a small quantity of

preservative lubricating oil. Maintain this protective film at all times. Clean and lightly oil the socket, socket cap, and collar of the baseplate.

Cleaning Before Firing

Before firing, the mortar crews should complete the following actions:

1. Inspect the three units of the mortar for cleanliness.

2. Clean the bore and firing pin with a clean, dry cloth. Do not apply oil to these parts before firing.

3. Do not leave any waste on the firing pin or in the barrel. Do not use grease.

4. Clean thoroughly and oil lightly all metal moving parts with preservative lubricating oil.

Cleaning After Firing

Clean the bore and all working parts of the mortar immediately after you complete firing. When cleaning cannot be accomplished immediately, apply oil to prevent corrosion. At the first opportunity, clean, oil, and inspect the mortar. If necessary, have repairs and replacements made by the unit armorer.

Clean the bore with rifle-bore cleaner immediately after you complete firing and 3 consecutive days thereafter (a minimum of four cleanings). The barrel should be cool enough to touch with your bare hand before using bore cleaner on it. The cleaner evaporates at 150°F, and such evaporation causes dark spots on the barrel. When rifle-bore cleaner is not available, use a hot soapy solution or plain hot water. Clean the vent and firing pin, as described previously, using a liberal quantity of soapy solution instead of rifle-bore cleaner. Dry the parts by using clean rags and applying preservative lubricating oil. When cleaning the mount, take care to remove dirt from all crevices. Clean all moving parts with rifle-bore cleaner, dry them, and apply preservative lubricating oil to all surfaces. To distribute the oil over the working surfaces, operate the traversing and elevating cranks. Clean the socket on the baseplate, as discussed previously.

FORWARD OBSERVER

The forward observer (FO), as the “eyes” of the indirect-fire team, has the primary mission of locating suitable targets and calling for and adjusting fire on these targets. He also has the mission of collecting intelligence information that can be derived from surveillance of his area of responsibility y. Such information is reported through charnels to higher headquarters.

To accomplish his primary mission, the FO must select an observation post (OP) from which he can obtain maximum observation of his area of responsibility and still have the necessary cover and concealment. (It is also desirable for the approach to the OP to have more than one covered and concealed route, so the FO cannot be observed by the enemy as he moves in or out of this OP.)

The forward observer, working as part of the indirect-fire team, functions as an effective part of the team if he understands and applies the procedures and techniques discussed below.

Target-Grid Method of Adjustment

Using the target-grid method of adjustment, anyone with a means of communication to an infantry or artillery fire direction center and who can read an azimuth can adjust fire on the targets he can see. From the forward observer’s viewpoint, this method is much simpler than previous methods because he does not have to know the location of the guns and he does not have to compute as much data. It makes no difference how far he is off the gun-target line because the fire direction center (FDC) makes adjustments to keep the burst on the observer-target line. To place fire on the target, the forward observer follows three simple steps:

1. He establishes communication with the FDC.

2. He attempts to locate the target for the FDC.

3. If the initial round or rounds miss the target, he sends corrections to the FDC that will cause subsequent rounds to hit the target.

A trained FO or a communications expert is not necessary to observe and adjust fire for mortars; however, it helps to know communication procedures and the method of conducting fire as explained in this chapter.

The target-grid method of adjustment has the following advantages:

1. The FO enjoys freedom of movement on the battlefield since he is not concerned with the location of the mortar and the mortar-target line. This enables him

to accompany the unit he is supporting, thereby giving it close and continuous fire support.

2. One forward observer can mass the fires of all mortar and artillery units within supporting range on a given target.

3. The combat Seabee can fill any gaps in the forward observer's field of view, thus giving better indirect fire support to infantry units.

4. It simplifies the work of the forward observer and places the burden of computing on personnel at the FDC who usually work under better conditions.

5. It eliminates the necessity of training a large number of forward observers to compute correction factors and requires only relatively few trained computers at the FDC.

6. The system does not depend entirely on the accuracy of the forward observer's azimuth to the target. Errors as great as 100 mils can be made without having any appreciable effect on the adjustment. Larger errors throw the burst off the observer-target (OT) line; however, such errors are easily detected by the computer, and the correct azimuth can be quickly determined by connecting two on-line bursts on the plotting board and reading the azimuth of this line.

Forward Observer Procedures

When the FDC controls the fire of mortars emplaced in a section, anyone of the three forward observers can be used to adjust fire for the unit. Each forward observer is accompanied by a radiotelephone operator who carries and operates a radio. The forward observer also carries a telephone and a reel of wire. When necessary, the mortar squad leaders supplement or relieve the forward observers.

Each FO is assigned to observe and conduct fire for a particular rifle unit in the company sector or zone of operation. He is also charged with maintaining contact with the supporting unit and keeping himself and the FDC completely informed of the tactical situation. His primary activity is to watch the movement of the supporting unit and to adjust mortar fire on those targets interfering with the mission of that unit. His secondary mission is to provide military information to higher echelons through his means of communication. He does this through observing and correcting of prearranged fire and by adjusting fire on targets of opportunity that he observes or which are identified to him by others.

The relative position of the OT line with respect to the mortar-target line does not affect the forward observer's procedure in adjusting observed fire. The forward observer makes his spottings and gives his connections with respect to the OT line. He determines errors and sends confections to the FDC. The FDC converts these corrections to appropriate fire commands. This is done by plotting the forward observer's corrections so the mortar section can place the next burst at the point designated by the observer. To assist in the reporting of targets, each FO may be given a freehand sketch or a suitable map showing the registration point and any other reference points whose chart locations are known at the FDC.

Terminology used by forward observers has been standardized throughout the Army, Navy, and Air Force. Therefore, the FO of a mortar section who is familiar with the basic principles of forward observation procedures is capable of adjusting the fire of any type of indirect-fire weapon. To adjust the fire of indirect weapons of units outside his own company, he establishes communication with the firing unit and maintains it throughout the adjustment.

Location of Target

The observer may report the location of a target for the FDC by one of three different methods: grid coordinates, shift from the reference point, and polar coordinates. These are listed in the order of preferred use.

GRID COORDINATES. The forward observer may send the location of a target by grid coordinates, referring to a map or photomap. In this method, the forward observer sends an eight-digit coordinate that locates the target to the nearest 10 meters.

SHIFT. The forward observer reports the location of a target through a shift or change from a reference point, which may be the registration point, a marking round (to help identify the round, the observer may request a smoke round or airburst), a numbered target, or any other point whose chart location is known at the FDC. He gives the shift as a correction in meters to the nearest 10 for deviation and 25 for range from the reference point. When either the direction or altitude of the target is the same as that of the reference point, he omits the connection. The forward observer determines the shift as follows:

1. DEVIATION. He measures the deviation in mils from the reference point to the target with binoculars and

estimates the distance to the reference point. Then he determines the correction in meters from the reference point to the OT line by use of the mil-relation formula or the deflection table and the observer reference-point distance. He includes this deviation correction in his call for fire.

2. HEIGHT OF TARGET. When the difference in altitude between the reference point and the target is 50 or greater, this connection is announced in the call for fire. The height of the target may be determined as follows: Measure the angle of site to the target and to the reference point; then, by the mil relation, compute the amount so each is above or below the observation point. From these values, compute the connection for difference in altitude of reference point and target.

3. RANGE. The forward observer estimates the distance along the OT line to the target from the reference point. This distance is the range correction and is included in his call for fire.

The shift method gives accurate results for shifts of 400 mils or less and acceptable results for shifts up to 600 mils. For greater shifts in direction, the deviation error and the difficulty of estimating the distance from the reference to the target increase rapidly. For this reason, the forward observer selects and adjusts on other reference points so the large shifts to any likely targets can be kept to a minimum.

POLAR COORDINATES. When the forward observer's location is known by the FDC, report the initial location of the target by polar coordinates. The FDC plots the target along the azimuth and at the range from the observer's location as reported by the observer. This method is particularly desirable in the case of large lateral shifts and short observing (OT) distances. When the observer's location is not known at the FDC, he may send it by grid coordinates or some other means.

Correction by the Forward Observer

In fire without an FDC, the forward observer makes corrections differently than when operating with a fire direction center. He makes all deviation connections with respect to the gun-target line rather than with respect to the observer-target line. All deviation corrections are sent to the mortar in mils or turns of the traversing handwheel.

Observer Within 100 Meters of the Mortar Position. The best location for the forward observer for rapid-fire adjustment is at the mortar position where his deviation spotting and deflection correction in roils, to be placed on the mortar sight, are the same. The tactical employment of the mortar usually makes it necessary for the forward observer to be in a position other than at the mortar; however, when the forward observer is located within 100 meters of the mortar position, the deviation error that he reads in his binoculars can be applied directly to the sight without any computations. This is true because the angle that exists between the observer-burst line and observer-target line is, for all practical purposes, equal to the angle that exists between the mortar-burst and the gun-target lines. Any slight difference between these two angles is compensated for by the inherent dispersion of the weapon and the bursting area of the round. For example, when the observer, from a position within 100 meters of the mortar location, observes the burst to the left of the target and reads that it is 40 mils left on the mil scale of his binoculars, he orders a correction of RIGHT-FOUR-ZERO.

The gunner applies this connection directly to the previous deflection setting, using the LARS (left add, right subtract) rule.

Observer More than 100 Meters from the Mortar Position. It is not always possible for the observer to be located within 100 meters of the mortar position. When he cannot locate himself within 100 meters of the mortar position, he must locate himself within 100 meters of the gun-target line. It can be readily seen that this might present some difficulty in visualizing the gun-target line and getting within 100 meters of it. When the observer is attacking targets over a wide frontage, he is required to move frequently and his movement is limited. In this situation, the angle that exists between the mortar-burst and the gun-target line is not equal to the angle that exists between the observer-burst and the observer-target line, and certain computations must be made to correct the differences in these angles. For example, when the observer is halfway between the mortar and the target, the correction to be made on the sight is one half of his deviation spotting; when the mortar is halfway between the observer and the target, the correction is twice his deviation spotting. As other distances give other ratios, it is necessary to apply a correction factor to the number of mils spotted before ordering a deflection change. This factor is a fraction, the numerator of which is the observer-target distance, and the denominator of which is the gun-target distance; that is

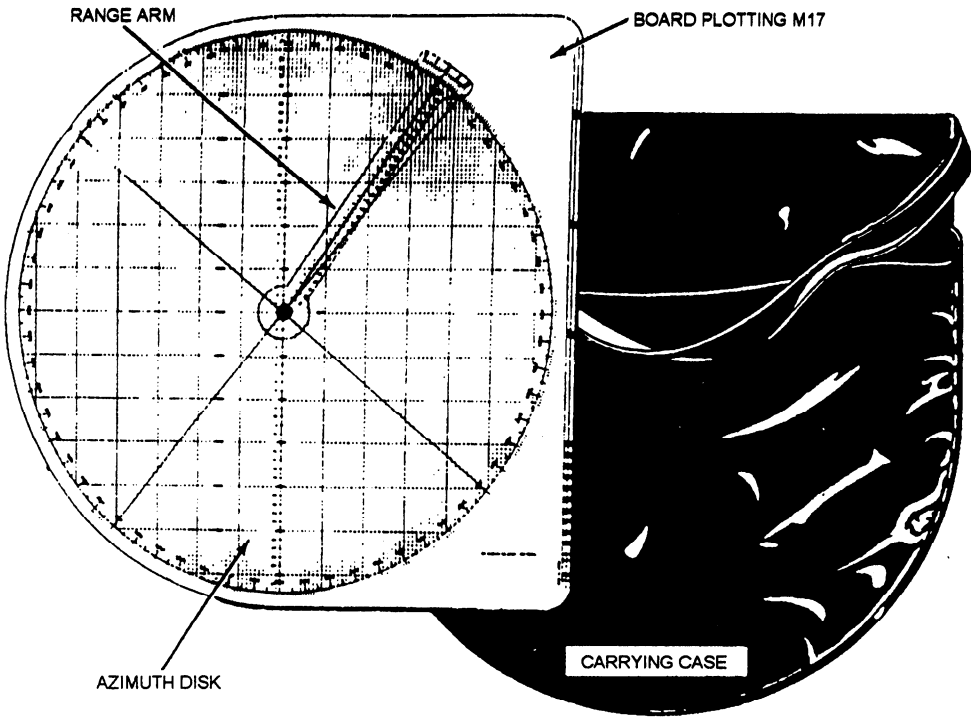


Figure 14-24.—Plotting board and carrying case.

Correction factor is

$$\frac{\textit{observer–target distance}}{\textit{gun–target distance}} \textit{ or } \frac{OT}{GTA}$$

For example, suppose the distance from the observer to the target is 1000 meters, the gun-target distance is 1200 meters, and the deviation of the burst from the target as read by the observer is 60 mils. The correction factor is

$$\frac{1{,}000}{1{,}200} \textit{ or } \frac{5}{6}$$

The change in deflection equals

$$\frac{5}{6} \times 60 \textit{ mils or } 50 \textit{ mils}$$

In this method, you should round off distances to the nearest 100 meters for simplicity and speed of computation.

FIRE DIRECTION CENTER PROCEDURES

The FDC is located in the headquarters section of the mortar platoon. Through the FDC, the platoon commander is able to control and quickly mass the fire of his entire unit. The FDC is normally located at or near the firing position and maintains contact with the guns by use of wire communications. Calls for fire are reported from all sources directly to the FDC where the targets are plotted on the firing chart (plotting board). From this chart, firing data is prepared by the computer (a member of the FDC) and announced to the mortar crews as fire commands. The FDC can be operated by the computer alone; however, it is desirable to include a radiotelephone operator, so the computer can be dedicated to computing firing data and issuing fire commands.

PLOTTING BOARD

The M17 plotting board is a fire-control instrument that helps in computing firing data by providing the range and direction from the mortar position to the target. The M17 plotting board is sturdy, easy to operate, accurate, and suitable for use in the field under adverse atmospheric conditions. The plotting board consists of a pivoted disk of transparent plastic and a removable range scale arm, both attached to a flat base grid. The M17 plotting board is carried in a durable nylon case, as shown in figure 14-24.

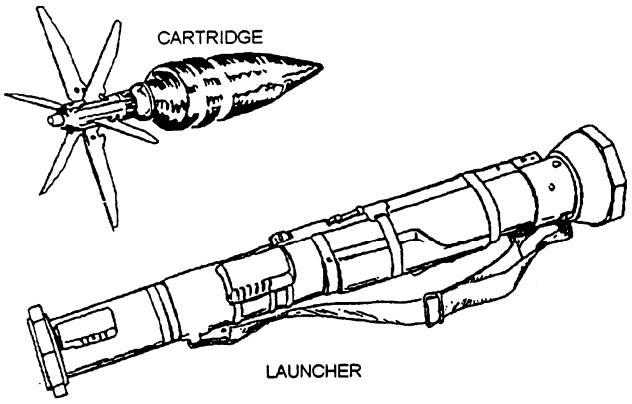


Figure 14-25.—Launcher 84-mm, M136 (AT4), Heat.

LAUNCHER AND CARTRIDGE, 84-MM, M136 (AT4), HEAT

The launcher and cartridge, 84-mm, M136 (AT4), HEAT, is a lightweight, self-contained antiarmor weapon. It consists of a free-flight, fin-stabilized cartridge packed in an expendable launcher. It is issued as a round of ammunition and requires minimum operator maintenance. The launcher (fig. 14-25) serves as a watertight packing container for transportation and storage; however, when the launcher is placed in the firing position, it serves to ignite and guide the rocket on its initial flight toward the target. Once fired, the launcher is designed to be discarded.

The AT4 is designed to withstand arctic, tropic, and desert conditions or any combination of natural environments. It may be used under conditions of limited visibility. Target engagement, however, is limited by the ability of the firer to detect and identify the target visually and to determine the range to the target.

LAUNCHER

The launcher is a one-piece, disposable, fiberglass-wrapped tube. The launcher has the following components affixed to it (fig. 14-26).

- Transport Safety Pin. Provides safety for transporting. It is attached to the launcher by a lanyard.
- Cocking Lever. Cocks firing mechanism.
- Fire-Through Muzzle Cover. Keeps out moisture and prevents foreign objects from entering the muzzle.
- Color-Code Band. Indicates type of cartridge.

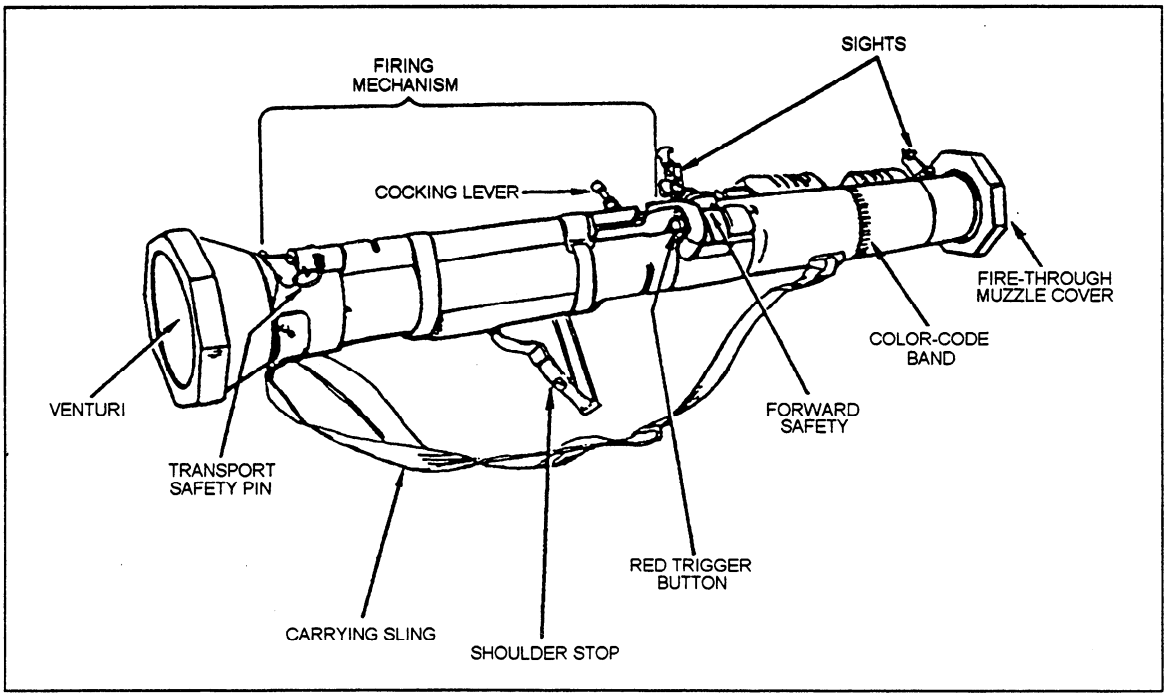


Figure 14-26.—Launcher components.

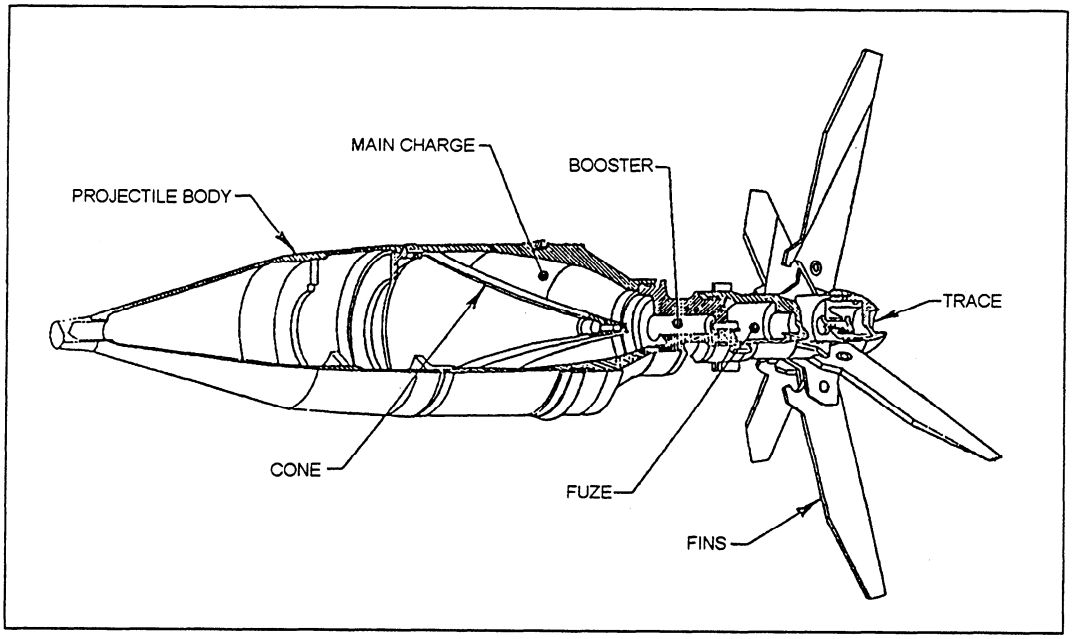


Figure 14-27.—Cartridge XM136 (AT4).

l Sights.

1. Front sight. Consists of a sight blade, center post, and right and left lead posts.

2. Rear sight. Consists of a sight blade, range setting knob, range indicator, 2-mm peephole, and 7-mm peephole.

- Venturi. Performs two functions:

1. Protects the weapon from damage if dropped.

2. Directs the flow of the backblast.

- Forward Safety. Must be fully depressed and held before pressing trigger button or launcher will not fire.

- Red Trigger Button. Fires the weapon.

- Shoulder Stop. Helps stabilize the launcher on the shoulder.

- Carrying Sling. Provides a means for carrying the launcher.

- Firing Mechanism.

AMMUNITION

The AT4 is issued as a round of ammunition. The cartridge consists of a fin assembly with tracer element; point-initiating, piezoelectric fuze; warhead body with liner; and a precision-shaped explosive charge (it is the only tactical ammunition for the AT4) (fig. 14-27). The AT4 is used mainly as an antiarmor weapon; however, it can be used against gun emplacements and bunkers.

TECHNICAL DATA

Launcher

Weight:	Overall system: 14.8 pounds. Cartridge: 4 pounds.
Caliber:	84 mm.
Length:	40 inches.
Muzzle Velocity:	950 feet per second.
Range:	Maximum range: 2100 meters or 6,890 feet.
	Maximum effective range: 300 meters or 985 feet.
	Minimum arming range: 10 meters or 33 feet.

Tactical Cartridge

Length:	460 mm (18 inches).
Caliber:	84 mm.
Warhead:	HEAT (precision-shaped charge).
Fuze:	Piezoelectric crystal.

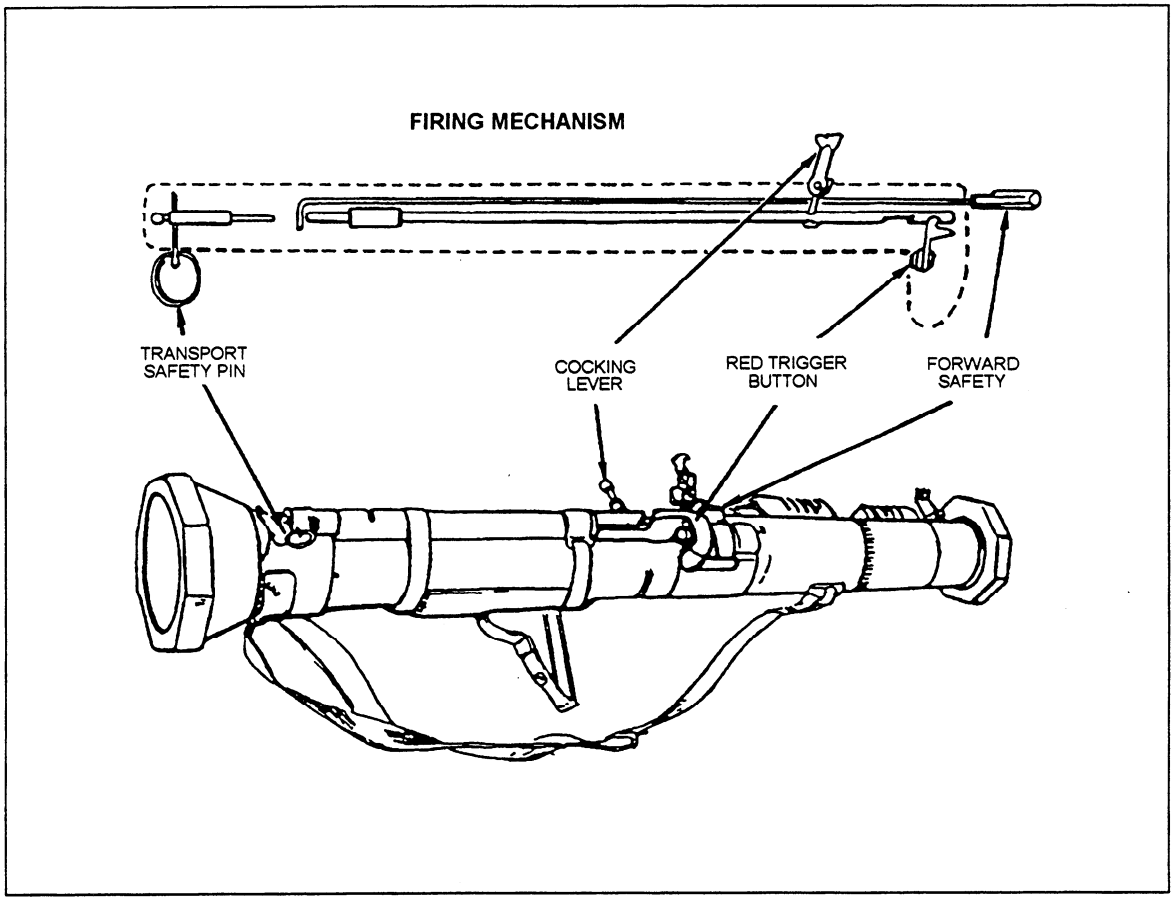


Figure 14-28.—Firing mechanism.

CONTROLS

The firing mechanism is mechanical (fig. 14-28). It includes the red trigger button, the enclosed firing rod with firing rod spring, and three safety devices. The red trigger button is located forward of the cocking lever just behind the forward safety. The weapon cannot be fired unless the three safety devices have been disengaged.

1. Transport Safety Pin (Step 1, fig. 14-29). The transport safety pin blocks the movement of the firing pin and prevents it from striking the cartridge percussion cap (not shown). To disengage the transport safety pin, pull it out and release.

2. Cocking Lever (Step 2, fig. 14-29). The cocking lever is attached to the firing rod. When the cocking lever is in the SAFE position, there is no contact between the firing rod and the trigger. To cock the AT4, push the cocking lever forward and down with the thumb of your right hand. When the weapon is cocked, the firing rod is engaged with the trigger through the hooks on the front part of the firing rod and red trigger button.

3. Forward Safety (Step 3, fig. 14-29). The forward safety is located on the forward end of the firing mechanism. The forward safety is connected to a steel rod that prevents the firing rod from striking the firing pin. The forward safety must be fully depressed and held down before the launcher can be fired.

OPERATION

The following procedures are used to prepare the AT4 for immediate firing:

WARNING

BE SURE EARPLUGS ARE INSERTED. KEEP WEAPON POINTED TOWARD THE TARGET. KEEP BACKBLAST AREA CLEAR.

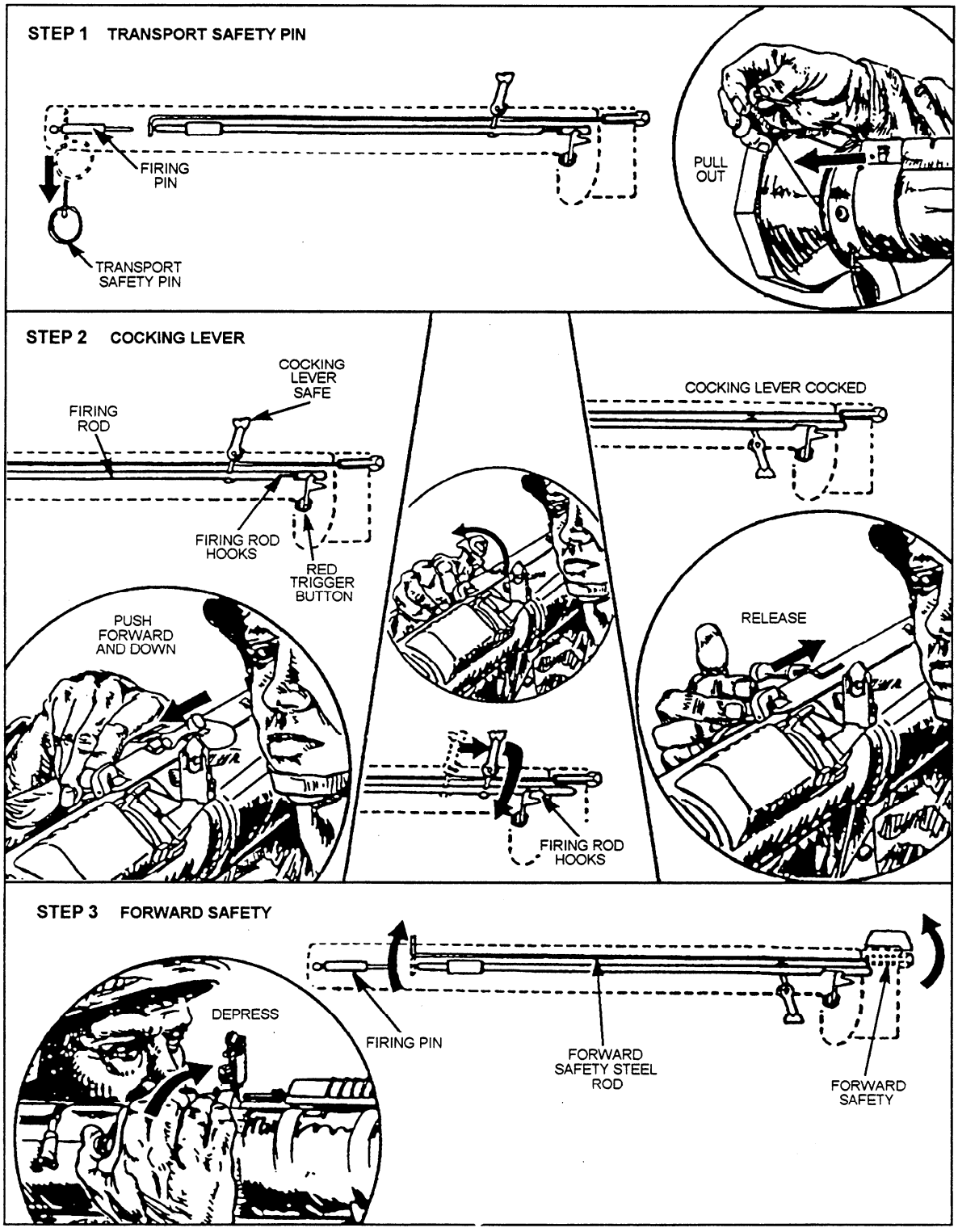


Figure 14-29.—Functioning of the firing mechanism.

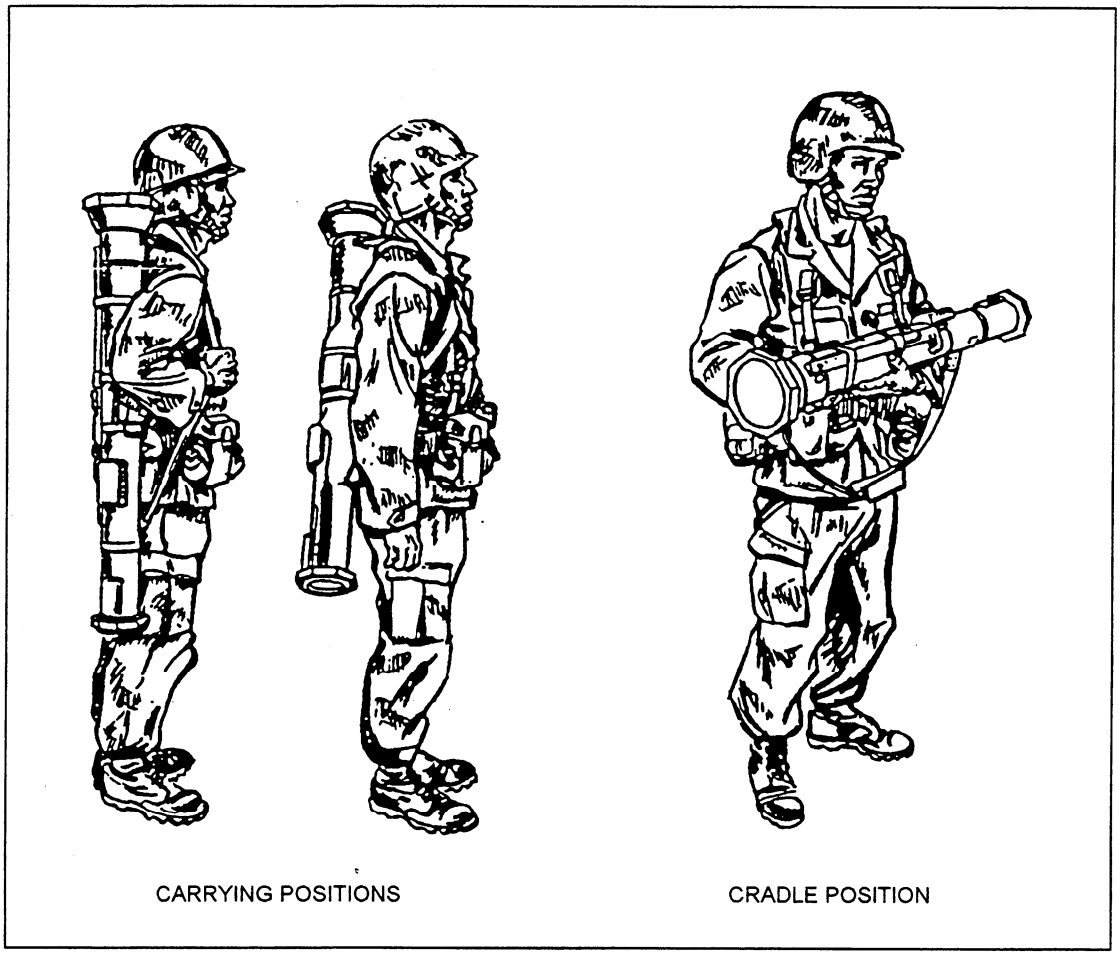


Figure 14-30.—Carrying and cradle positions.

• Remove the launcher from the carrying position and cradle it in your left arm (fig. 14-30).

• Remove the transport safety pin by pulling it out with your right hand and releasing it (Step 1, fig. 14-31).

NOTE: Be sure that the transport safety pin is attached to the lanyard and the lanyard is attached to the launcher. If it is not, retain the transport safety pin (it must be reinserted if the launcher is not fired).

• Unsnap the shoulder stop and unfold it (Step 2, fig. 14-31).

• Place the launcher on your right shoulder.

• Release the sights. Release the front sight by pressing down on the sight cover and sliding the cover to the rear. Release the rear sight by pressing down on the rear sight cover and sliding the cover to the front. Each sight pops up after release procedures (Step 3, fig. 14-31).

WARNING

KEEP WEAPON POINTED TOWARD TARGET. CHECK BACKBLAST AREA.

• Cock the launcher (Step 4, fig. 14-31) by unfolding the cocking lever with your right hand. Place your thumb under the cocking lever and, with the support of your fingers in front of the firing mechanism, push the cocking lever forward and then downward to the right. Let the cocking lever slide back

CAUTION

DO NOT REFOLD THE COCKING LEVER. THIS WILL INTERFERE WITH THE FUNCTION OF THE FIRING MECHANISM.

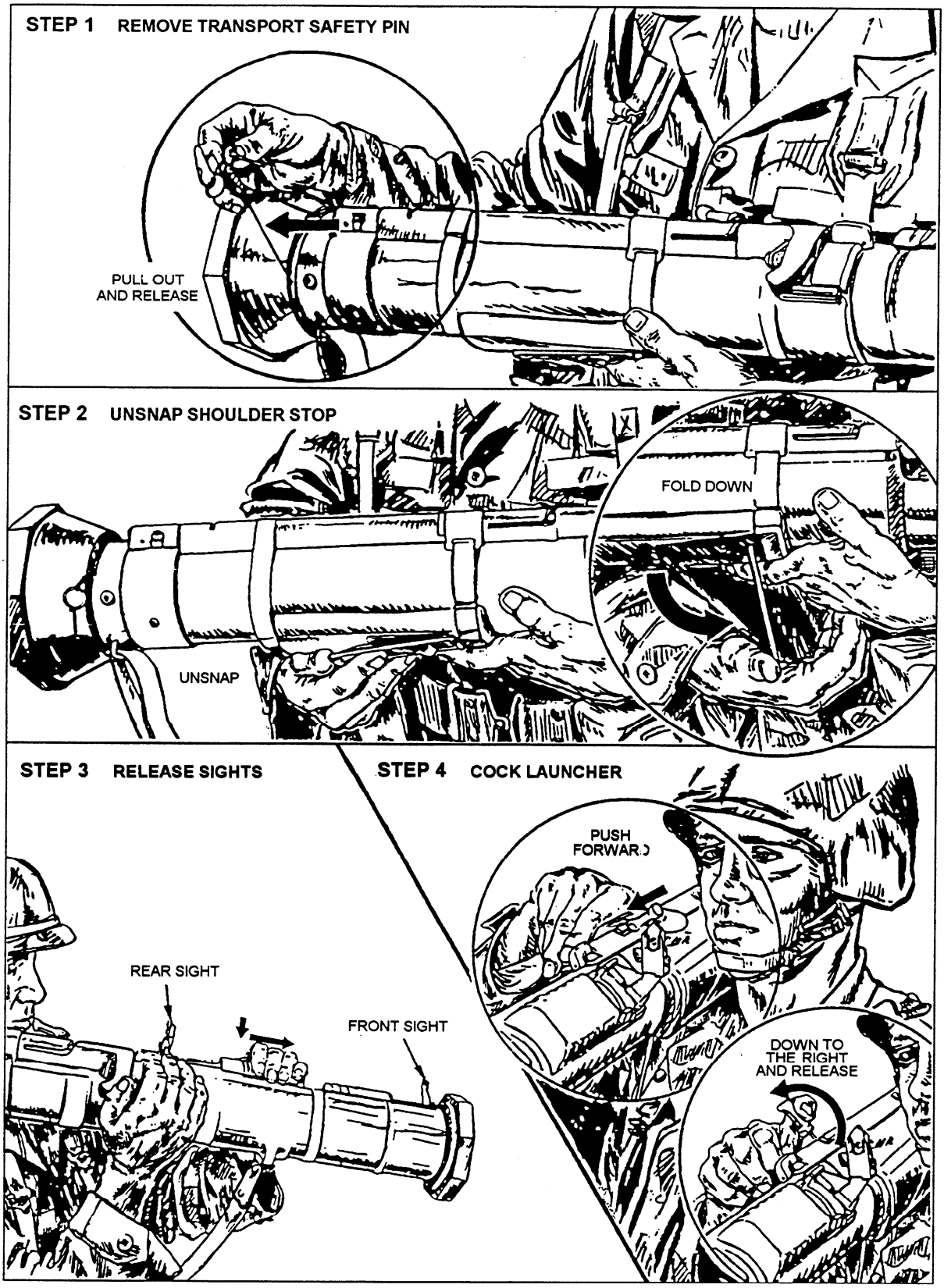


Figure 14-31.—Preparation for immediate firing.

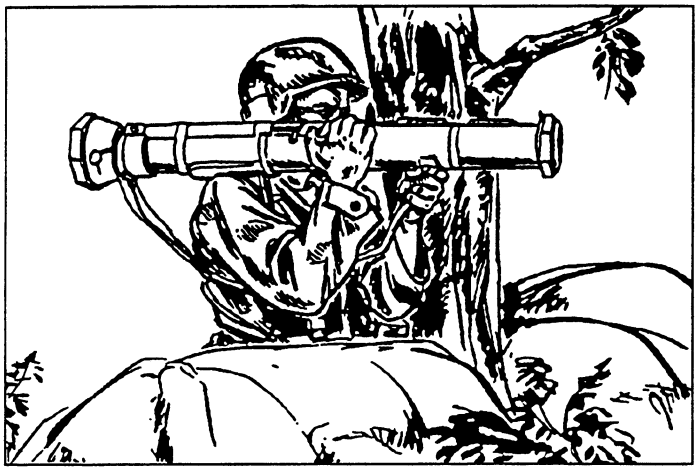


Figure 14-32.—Shoulder the weapon.

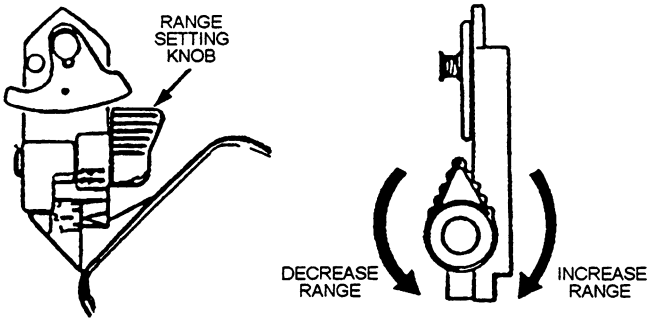


Figure 14-33.—Adjust range setting.

• Press the shoulder stop against your shoulder (fig. 14-32). For added stability, grasp the carrying sling near the muzzle with your left hand and pull back on the carrying sling until the shoulder stop is snug against your shoulder.

• Adjust the rear sight (fig. 14-33). When uncovered, the rear sight is preset on 200 meters, which is the battle-sight setting. During target engagement for targets more than 200 meters, a sight adjustment is necessary; for targets less than 200 meters, no adjustment is necessary. The sight is adjustable below 200 meters; however, because of the flight dynamics of the projectile, adjusting the range setting does not increase the hit probability for targets less than 200 meters.

• Using the index and middle fingers of your right hand, press the forward safety all the way to the left and hold it. At the same time, pull the launcher into your shoulder with your left hand, keeping your right hand against the forward edge of the firing mechanism housing for firing stability.

• To fire the launcher, press the red trigger button by gently applying pressure straightforward with the tip of your right thumb in a steady, smooth movement.

When the launcher is prepared for firing but is not fired, it is taken out of operation as follows:

• Release the forward safety.

• Return the cocking lever to the SAFE, uncocked position by reversing the procedures for cocking, and then fold the cocking lever down.

• Remove the launcher from your shoulder. Keep it pointed toward the target.

• Reinsert the transport safety pin all the way into the pinhole.

• Return the rear sight to the battle-sight setting of 200 meters; fold down the front and rear sight; close the sight covers.

CAUTION

REAR SIGHT MAY BE DAMAGED IF IT IS NOT RETURNED TO THE BATTLE-SIGHT SETTING (200 METERS) BEFORE CLOSING THE SIGHT COVER

• Refold the shoulder stop and snap it back into position; sling the launcher over either shoulder with the forward (muzzle) end down.

MISFIRE PROCEDURES

A misfire is a complete failure to fire and maybe caused by a faulty firing mechanism or by an element in the propelling charge explosive train.

CAUTION

KEEP THE WEAPON POINTED TOWARD THE TARGET.

Misfire Procedures (Training)

1. When the launcher fails to fire, immediately shout, “Misfire.”

2. Maintain the original sight picture.

3. Release the forward safety.

4. Recock the cocking lever. Check the backblast area; aim, fully depress, and hold down the forward safety; and press the red trigger button.

5. If the launcher still fails to fire, repeat Steps 1 through 4.

6. If the launcher still fails to fire, release the forward safety and return the cocking lever to the SAFE, uncocked position.

7. Take the launcher off your shoulder; keep the muzzle pointed toward the target.

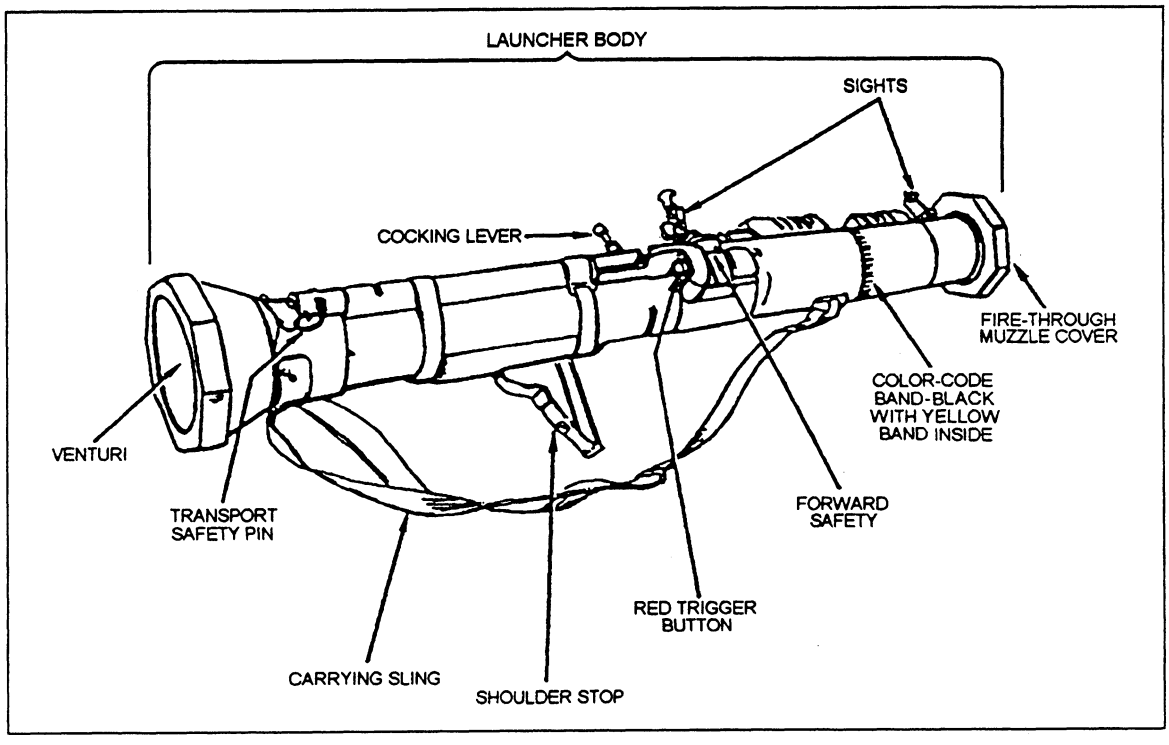


Figure 14-34.—Launcher inspection.

8. Reinsert the transport safety pin.

9. Wait 2 minutes, then carefully lay the faulty launcher on the ground, muzzle facing toward the target.

10. Dispose of the faulty launcher according to SOP (Range Safety Officer).

Misfire Procedures (Combat)

1. Release the forward safety. Immediately recock the cocking lever. Check the backblast area; aim, fully depress, and hold down the forward safety; and press the red trigger button.

2. If the launcher still does not fire, maintain your firing position, and return the cocking lever to the SAFE position. Remove the launcher from your shoulder and reinsert the transport safety pin. Lay the faulty launcher aside; keep the muzzle pointed toward the target. Immediately use another launcher to engage the target. Dispose of or destroy the faulty launcher according to standard operating procedures.

MAINTENANCE

The AT4 requires no preventive maintenance or repairs at the first or second echelon. No repair parts are supplied to the using organization.

DESTRUCTION

When capture of the AT4 is imminent or if it becomes necessary to abandon the system in a combat zone, the unit commander may order its destruction. Priority is given to the destruction of those parts most difficult to replace, such as the sight, firing mechanism, and launching tube. The same parts of the system should be destroyed to prevent the enemy from reconstructing one complete unit from several damaged ones. In combat, after the launcher has been fired, it should be destroyed to prevent the enemy from converting the launcher into a booby trap.

Destruction can be accomplished by four methods:

- Burning
- Demolition
- Gunfire
- Crushing

INSPECTION BEFORE FIRING

Since the AT4 is issued as a round of ammunition, rather than as a weapon, the launcher is completely sealed. Inspection is limited to visual examination of the external components. The launcher is waterproof. When the fire-through muzzle cover is intact, the launcher remains waterproof until fired. The overall condition of the launcher should be inspected before being used (fig. 14-34). The firer should ensure that

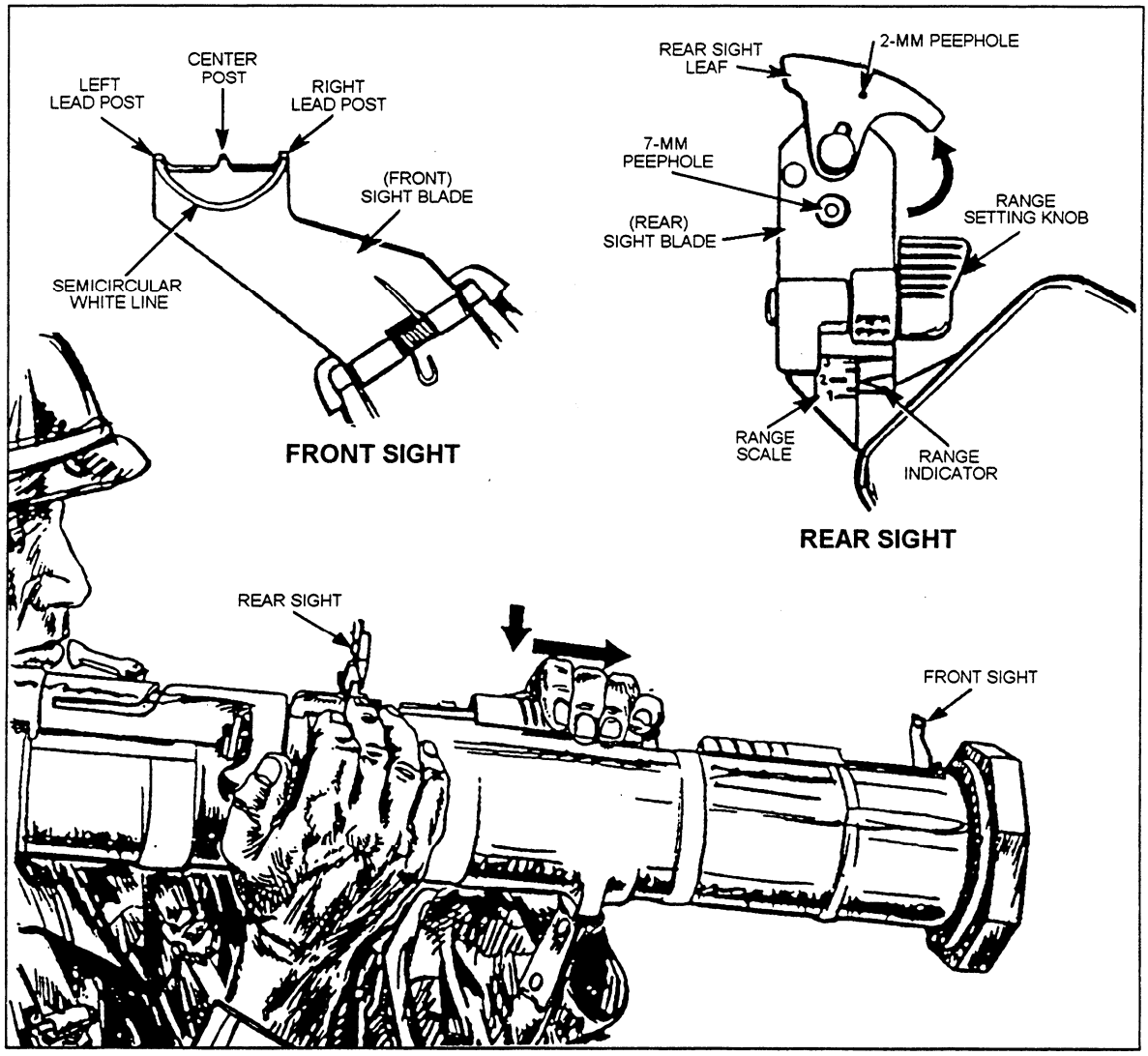


Figure **14-35.—Sight system.**

- the transport safety pin is in place and fully inserted. The lanyard is attached.
- the cocking lever is in the SAFE position and folded down.
- the fire-through muzzle cover is intact. If the seal is ruptured or torn, cut the seal out to ensure there are no foreign objects inside the launcher tube. To remove foreign objects, turn the tube muzzle down and shake it gently. Before firing, ensure there are no foreign objects in the muzzle.
- the launcher being used has a black color-code band with a yellow band inside.
- the sights function properly. Open the covers to see if the sights pop up and are not damaged.
- the forward safety does not move when depressed.
- the rear seal is not cracked or damaged. The rear seal is inside the venturi and is made of brown plexiglass. Before firing, ensure there are no foreign objects obstructing the rear of the launcher.
- the shoulder stop is not broken or damaged, and it unsnaps and folds down.
- the carrying sling is not frayed and is attached firmly to the launch tube.
- the launcher body has no cracks, dents, or bulges.
- the red trigger button is not missing, broken, or damaged.

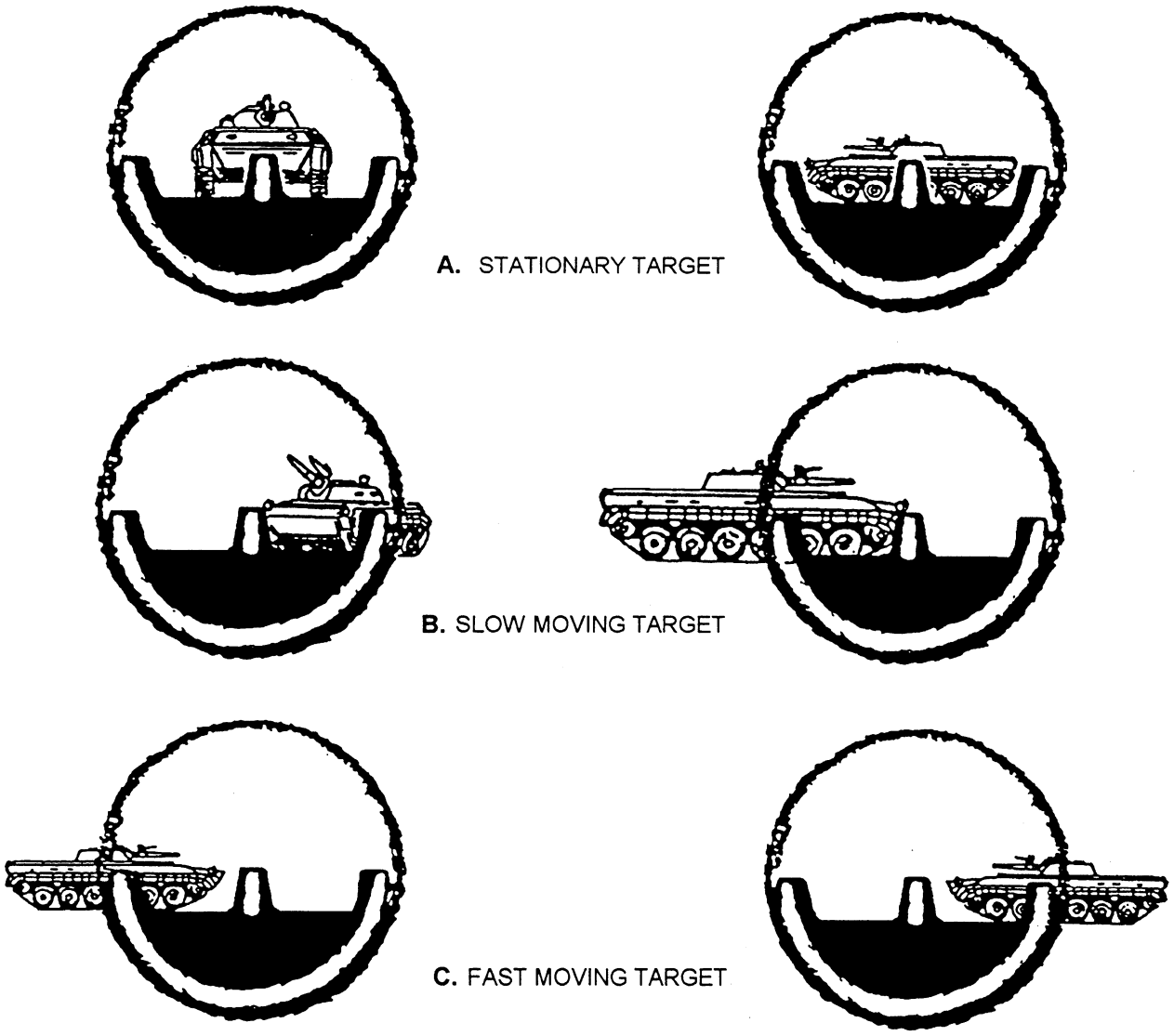


Figure 14-36.—Correct placement of the front sight lead posts.

SIGHTS

• Front Sight. The front sight consists of a sight blade with a center post and left and right lead posts (fig. 14-35). It has a semicircular white line to aid in obtaining the proper sight picture. To open the front sight cover, press down on the sight cover and slide it rearward.

• Rear Sight. The rear sight consists of a sight blade, range setting knob, range scale, 2-mm peephole (for normal light conditions), and 7-mm peephole (for limited visibility) (fig. 14-35). To open the rear sight cover, press down on the cover and slide it forward.

AIMING

In general, to aim the launcher, you must first estimate the range to the target. Once the range is determined, the launcher is placed in position on the right shoulder so the right eye is 2 1/2 to 3 inches from the rear sight. The firer is concerned with correctly pointing the AT4 so the cartridge hits the target when he fires. To do this, he must have the rear sight, the front sight posts, and the target (or aiming point) in proper relationship-known as the sight picture. A correct sight picture is obtained when the sights are properly aligned and the aiming point (target) is in correct relationship to the front sight posts.

ENGAGING THE TARGET

1. To engage a stationary target. Place the center post at the center mass of the target. Targets moving directly toward or away from the firer are the same as stationary targets (fig. 14-36, view A).

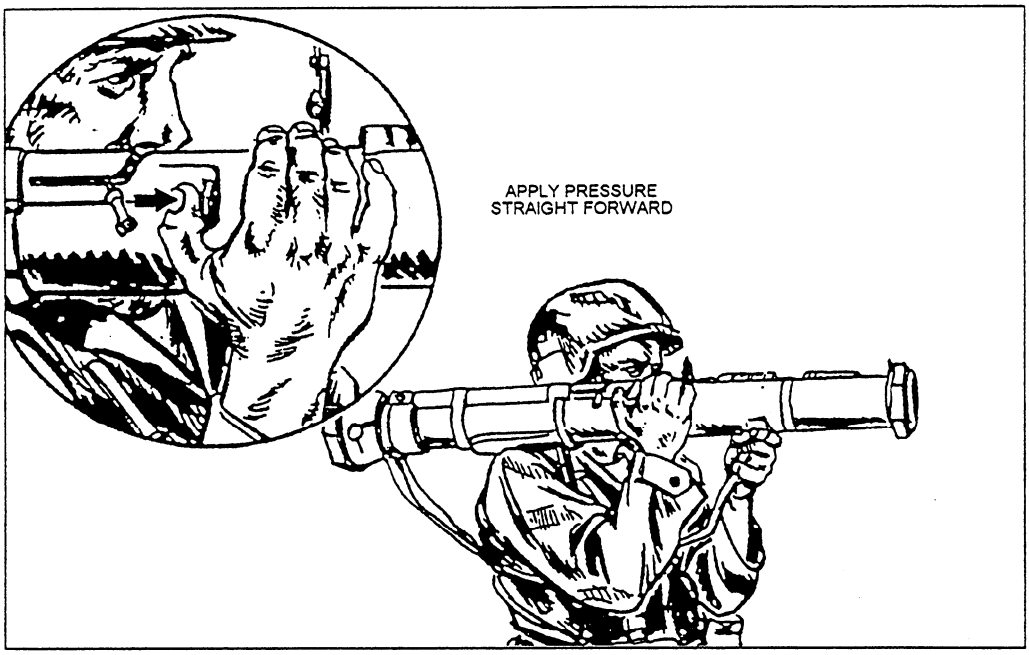


Figure 14-37.—Trigger manipulation.

2. To engage a slow moving target. Place the center post on the front leading edge of the vehicle (less than 10 miles per hour). This includes oblique moving targets (fig. 14-36, view B).

3. To engage a fast moving target (more then 10 miles per hour). When the target is moving to the left, place the right lead post at the center of the mass. When the target is moving to the right, place the left lead post at the center of the mass (fig. 14-36, view C).

TRIGGER MANIPULATION

The trigger for the AT4 is a red button on the right side of the tube. To fire the launcher, you must apply pressure straight forward with the thumb of your right hand in a steady, smooth movement. Proper trigger manipulation (fig. 14-37) can be developed by dry-fire practice with an expended AT4 or AT4 training devices.

FIRING POSITIONS

The AT4 is fired from the right shoulder only. It may be fired from the standing, kneeling, sitting, or prone position. The exact position may vary slightly to allow for the configuration of an individual's body. Any of these positions are suitable for stationary targets. In general, the most suitable positions for engaging moving targets are standing and kneeling. Situation, terrain, and gunner preference should govern the selection of the best position. Whenever possible, support should be used to stabilize the gunner's aim.

Standing Position

The standing position (fig. 14-38) is similar to that of firing a rifle. Face the target, execute a half-right face, spread your feet a comfortable distance apart, and place the launcher on your right shoulder; your body should be well-balanced with your hips level. Your left hand

Figure 14-38.—Standing position.

Figure 14-39.—Kneeling position.

Figure 14-40.—Modified kneeling position.

should be directly under the front of the launcher, grasping the carrying sling. Your left elbow should be placed against your body for stability. Grasp the firing mechanism with your right hand and keep your right elbow placed tightly against the body.

Advantages– Freedom of movement for tracking targets.
Good visibility.

Disadvantage– You are a good target.

Kneeling Position

The kneeling position (fig. 14-39) is similar to the kneeling supported position for firing a rifle. To assume this kneeling position, first assume the standing position. Kneel on the right knee and point your left leg toward the target. Keep your left foot at a right angle to and opposite your right knee, forming a right angle to the ground with your left leg. Sit back on your right heel, while shifting the weight forward. Rest your left elbow just forward of your left knee. Avoid bone-to-bone contact. Hold your right elbow firmly against your body.

Advantage– Stable firing position.

Disadvantage– Limited movement for tracking.

Modified Kneeling Position

The modified kneeling position (fig. 14-40) is the best for tracking moving targets. To get into this position for engaging moving targets, first assume the standing position. Kneel on your right knee, keeping the thigh of your right leg vertical. Keep your buttocks and back straight. Point your left leg toward the target, keeping your left foot at a right angle to and opposite your right knee. Keep your left thigh parallel to the ground. Keep your elbows tucked against your sides.

Advantage– Freedom of movement for tracking.

Disadvantage– Unstable firing position.

Use either position when firing at stationary or moving targets; however, the modified version allows tracking similar to the standing position. Maximum use of protective barriers and supported positions is essential with the kneeling positions to increase stability and reduce vulnerability.

Sitting Position

There are two sitting positions that are suitable for firing at stationary targets and are more stable than the kneeling positions.

1. For the sitting position (fig. 14-41), keep the launcher pointed toward the target and execute a

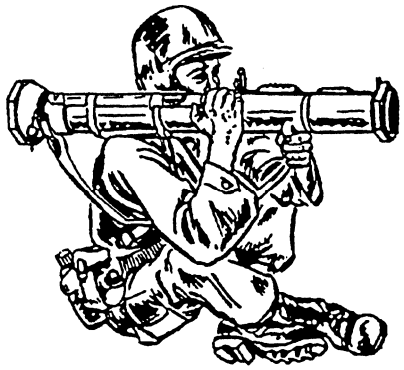


Figure 14-41.—Sitting position.

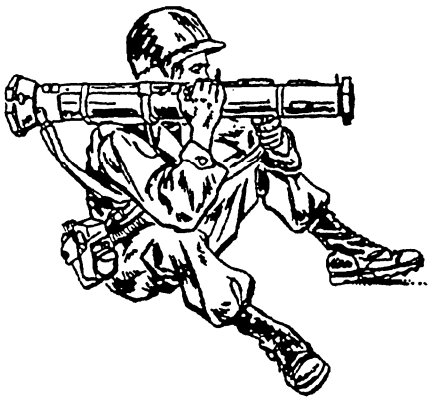


Figure 14-42.—Modified sitting position.

Figure 14-43.—Prone position.

half-left face. Sit with your legs crossed, and place the launcher on your right shoulder. Place your right hand on the firing mechanism and grasp the carrying sling with your left hand. Lean slightly forward from the hips, and rest your elbows forward of your knees to avoid bone-to-bone contact.

2. To assume the modified sitting position (fig. 14-42), keep the launcher pointed toward the target and execute a half-left face. Sit with your legs partly extended and well apart; place the launcher on your right shoulder. Dig your heels into the ground as in the conventional rifle position. Rest your elbows forward of your knees to avoid bone-to-bone contact.

Advantages– Stable firing position.
You are a small target.

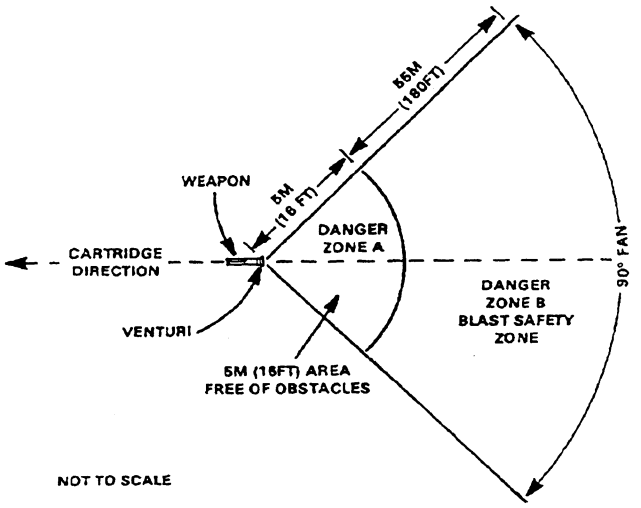


Figure 14-44.—Backblast danger zones.

Disadvantages– Restricted movement.
Limited visibility.

Prone Position

To assume the prone position (fig. 14-43), first lay the launcher on the ground, pointed toward the target. Then lie on your stomach at an angle of not less than 90 degrees to the line of fire to keep your body clear of the backblast. Your body should be straight, and your right leg should be directly on a line running through your right hip and right shoulder. Move your left leg to the left as far as possible without discomfort. Keep both heels close to the ground. Place the launcher on your right shoulder and place both elbows under the launcher. Hold your head steady with your right eye lined up with the sights. Tracking a moving target from the prone position is not recommended. The firer's movement is limited. Your legs and feet could be injured by the backblast by changing the position of the launcher.

Advantages– Very stable firing position.
You are a small target.

Disadvantages– Limited movement for tracking.
Limited elevation of the launcher.
Poor visibility.

GENERAL SAFETY PRECAUTIONS

The following precautions are necessary to prevent injury to personnel and damage to material:

1. Take care in selecting positions for firing. Avoid areas that could cause you to fire through a screen of

brush or trees. Impact with a twig or branch may deflect the rocket or cause it to detonate. You must try to obtain concealment, but not at the risk of safety.

2. To prevent the rocket from striking the foreground and causing serious injury to personnel, maintain the launcher in the firing position until the rocket has left the launcher.

3. Avoid the blast of flame and ejected residue to the rear of the launcher. Remove flammable material, such as dry vegetation, from the backblast area (fig. 14-44). Keep personnel and ammunition clear of the rear danger area unless adequate shelter protection is provided. Sand or loose dirt in the backblast area can also reveal your position to the enemy.

4. Do not fire rockets at temperatures below –40°F or above 140°F.

5. Never fire a damaged weapon.